GPS AutoSteer System
Installation Manual

Supported Vehicles

John Deere Non-AutoTrac Ready

7220	7130
7320	7230
7420	7330
7520	7430
	7530

PN: 602-0196-01-A

LEGAL DISCLAIMER

Note: Read and follow ALL Instructions in this manual carefully before installing or operating the AutoSteer system.

Note: Take careful note of the safety information in the Safety Information section and throughout this manual.

The manufacturer disclaims any liability for damage or injury that results from failure to follow the instructions and warnings set forth herein.

Please take special note of the following warnings:

1. There is NO obstacle avoidance system included in the manufacturer’s product. Therefore, users must always have an operator on the equipment when the AutoSteer system is in use to look for any obstacles including people, animals, trees, ditches, buildings, etc.
2. During installation of the AutoSteer system and during the Calibration and Tuning processes the vehicle's wheels turn from side to side and the vehicle moves. Be sure that all people and obstacles are clear of the vehicle before installation, calibration and tuning, or use of the AutoSteer system.
3. Use of the AutoSteer system is NOT permitted while the vehicle is on public roads or in public areas. Ensure that the system is OFF before driving on roads or in public areas.

Special Requirements

Tools

This list consists of the tools required to complete the installation. The installer is assumed to have a complete set of common installation tools.

1/8" Allen wrench	3/8" open wrench	19mm open wrench
5/32" Allen wrench	1/2" open wrench	17mm socket and ratchet
3/16" Allen wrench	9/16" open wrench (2x)	18mm socket and ratchet
1/4" Allen wrench	11/16" open wrench	19mm socket and ratchet
10mm Allen wrench	3/4" open wrench	21mm socket and ratchet
#2 Phillips screwdriver	13/16" open wrench	Breaker bar for 18mm socket
1/2" ratchet wrench	7/8" open wrench	Torque wrench for 18mm socket
1/2" socket and ratchet	15/16" open wrench	Wire cutter small
9/16" socket and ratchet	1-1/16" open wrench	Cleaning rags
15/16" socket and ratchet	Hacksaw with steel cutting blade (for optional wheel angle sensor installation)	5000 psi Pressure Gauge with a Short Hose and 1/8" Test Port Coupler that meets the SAE J1502 standard.
Oil catch pan	Cleaning brush	Tape measure (12ft minimum)
Cable puller pole	Ten foot (3 meter) ladder	

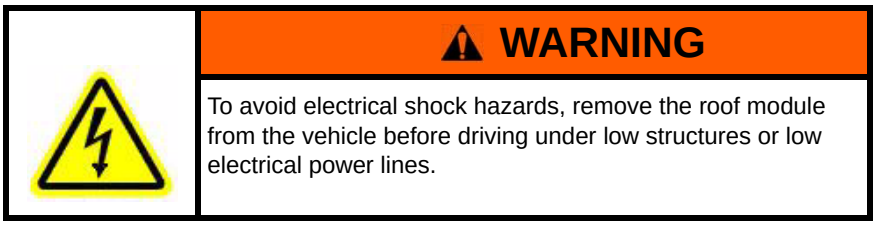
Safety Information

Warning Alerts

The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:

- As the operator of the vehicle, you are responsible for its safe operation.
- The steering system is *not* designed to replace the vehicle's operator.

Note: Verify that all screws, bolts, nuts, hose connections, and cable connections are tight after the final installation of the AutoSteer system on the vehicle.


⚠ WARNING
To avoid electrical shock hazards, remove the roof module from the vehicle before driving under low structures or low electrical power lines.

⚠ WARNING
Ensure that you are in a stable position on the vehicle platform when installing or removing the roof rail and roof module so you do not fall.

⚠ WARNING
To prevent accidental death or injury from being run over by the vehicle, never leave the vehicle's operator chair with the GPS system engaged.

⚠ WARNING

High-Pressure Fluid Hazard

Read the Owner's Manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

⚠ WARNING

To understand the potential hazards associated with the operation of AutoSteer equipment read the provided documentation before installing the GPS steering system on a vehicle.

⚠ WARNING

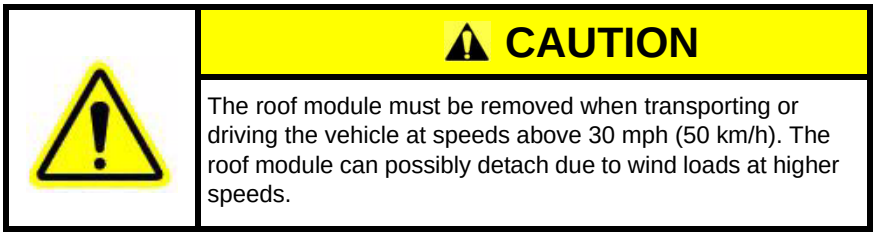
To prevent the accidental engagement of GPS steering and loss of vehicle control while driving on roads, shut down the AutoSteer system (exit the program). Never drive on roads or in public areas with the GPS steering system turned on.

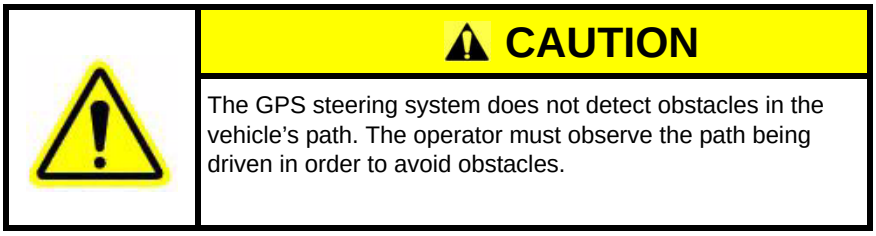
⚠ WARNING

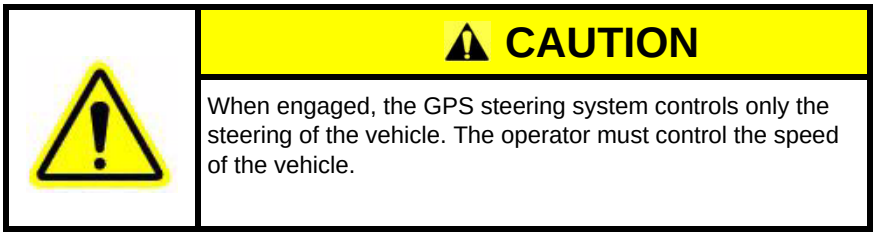
Do not stand close to the wheels and do not move the machine while you are adjusting the relief valve. Turn off the engine and engage the parking brake before standing under or next to the machine.

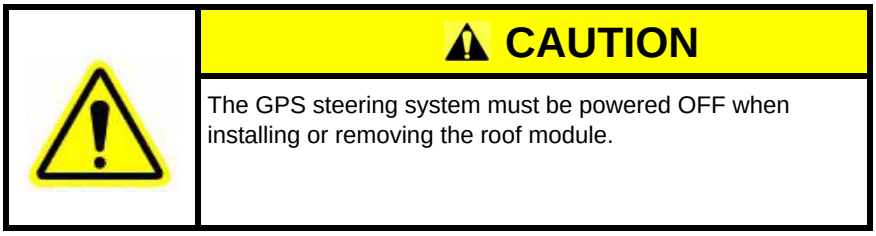
Caution Alerts

The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:


CAUTION
The roof module must be removed when transporting or driving the vehicle at speeds above 30 mph (50 km/h). The roof module can possibly detach due to wind loads at higher speeds.


CAUTION
The GPS steering system does not detect obstacles in the vehicle's path. The operator must observe the path being driven in order to avoid obstacles.


CAUTION
When engaged, the GPS steering system controls only the steering of the vehicle. The operator must control the speed of the vehicle.



CAUTION

The Roof Module must always be firmly secured to the roof rail using the hardware whenever the vehicle is in operation to prevent the roof module from releasing from its bracket and falling.

Vehicle Requirements

The vehicle must be equipped with a fully functional Power Beyond System. The Power Beyond system provides the following hydraulic ports on the rear of the vehicle:

- Pressure
- Tank
- Load Sense

The vehicle steering and hydraulic systems must be in good working order before installing the AutoSteer system. Check for loose or worn parts. Drive the vehicle and confirm that it steers straight and the wheels can be turned from lock to lock. Check the steering system hydraulic hoses and connections to ensure there are no oil leaks.

The vehicle electrical system and battery must be in good working order.

The vehicle must be non AutoTrac ready. AutoTrac ready vehicles require a different installation kit. Contact your AutoSteer dealer for the correct installation kit.

The vehicle should be fully cleaned before installing the AutoSteer system. A clean vehicle will improve the overall installation and cable routing and will also reduce the chance for oil contamination when the hydraulic connections are opened.

Important Information

Note: Verify that all screws, bolts, nuts, hose connections and cable connections are tight after the final installation of the AutoSteer system on the vehicle.

This installation requires that the pressure relief valve on the steering valve be adjusted after the system has been installed but prior to calibration and tuning. After a preliminary hydraulic leak test, follow the procedure for setting the pressure relief valve.

Technical Support

Refer to your owner's manual for technical support information.

Contact Information

Refer to your owner's manual for contact information.

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Installation Overview

This **Installation Overview** chapter contains part numbers, kit overview diagram, cabling diagram and the installation procedure.

- *Kit Overview*
  - *Sub-Assemblies*
    - *Compact Valve Kit Components*
    - *Hose Kit Components*
    - *Bracket Kit Components*
- *Installation Procedure Outline*
- *Cable Diagram*

This installation guide describes the installation of the AutoSteer system on several models of John Deere wheeled vehicles as listed on the front cover of this manual. The AutoSteer installation kit PN: 188-0009-01 is used on these John Deere 7000 series of Non AutoTrac Ready wheeled vehicles. The vehicle specific sub-assemblies for the vehicle series are listed in *Table 1-1*.

Note: If you are installing an electric steering wheel actuator such as OnTrac II, skip the Steering Valve, SA Module, and SA Module Harness installation information in this book and refer to your electric steering product manual for further instructions.

Kit Overview

This Kit Overview section is divided into sub-sections for each of the three sub-assemblies as shown in *Figure 1-1*. The components in each sub assembly are described in the following sections.

Figure 1-1 John Deere Kit Components (PN: 188-0009-01)

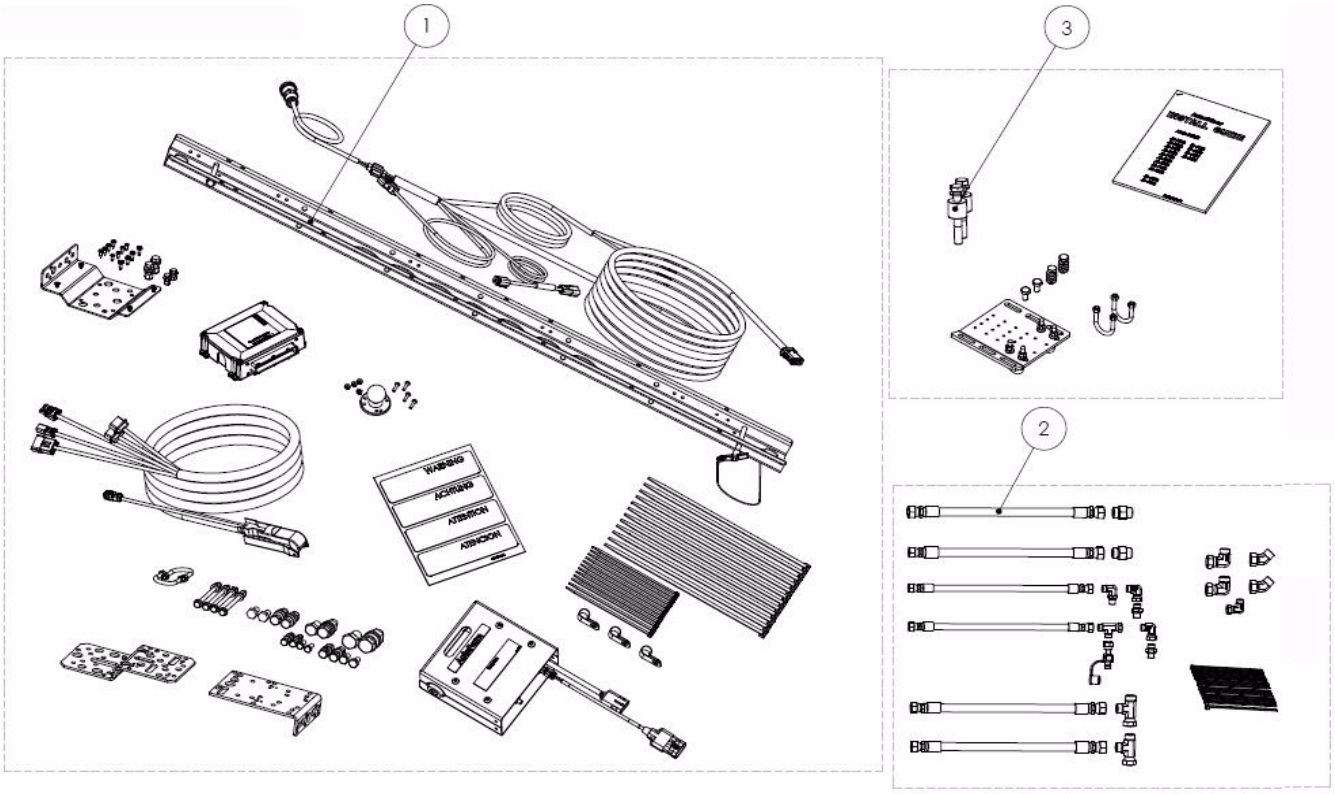


Table 1-1 John Deere Kit Sub-Assemblies (PN: 188-0009-01)

Item	Component	Part Number
1.	Compact Valve Kit	153-0001-01
2.	Hose Kit	500-0296-01
3.	Bracket Kit	152-0008-01

Sub-Assemblies

This vehicle installation kit contains the following components:

- *Compact Valve Kit Components*
- *Hose Kit Components*
- *Bracket Kit Components*

Compact Valve Kit Components

Figure 1-2 Installation Kit Sub-Assembly (PN: 153-0001-01)

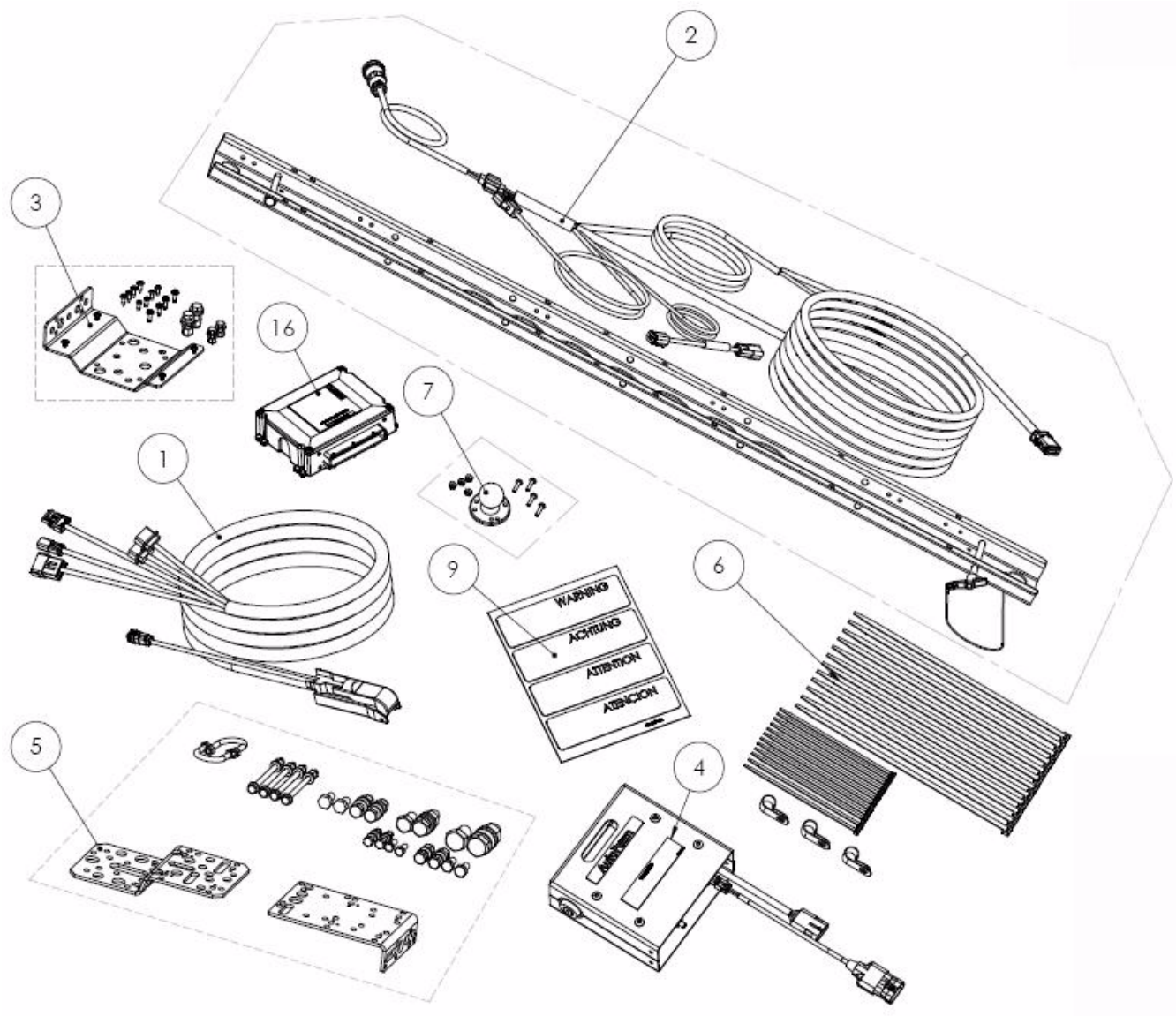


Table 1-2 Installation Kit Sub-Assembly Components (PN: 153-0001-01)

Item	Component	Part Number
1.	SAM Harness	201-0371-02
2.	Main Cable Harness and Roof Rail	200-0497-02
3.	SA Module Bracket	200-0190-01
4.	Steering Valve Assembly	200-0457-01

Item	Component	Part Number
5.	Steering Valve Bracket Kit	200-0434-01
6.	Mounting Hardware	200-0076-01
7.	Display Mounting Base	200-0508-01
9.	Warning Labels	600-0085-01
16.	SA Module Assembly	200-0206-01

Hose Kit Components

Figure 1-3 Hose Kit Components (PN: 500-0296-01)

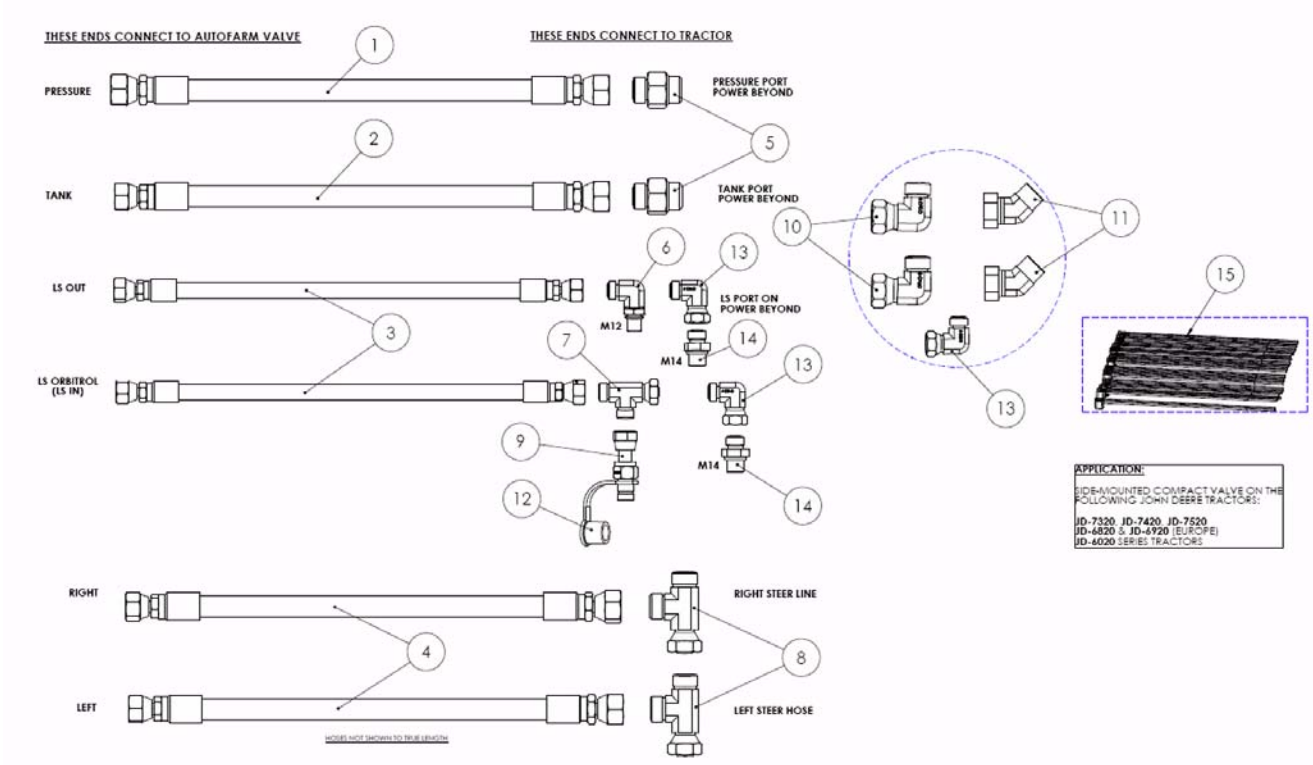


Table 1-3 Hose Kit Components (PN: 500-0296-01)

Item	Component	Part Number
1.	Hose Assembly 3/8” x 90”	F451TC-JCJC080806-90
2.	Hose Assembly 3/8” x 90”	F451TC-JCJC060806-90

Item	Component	Part Number
3.	Hose Assembly 1/4” x 90”	F451TC-JCJC040404-90
4.	Hose Assembly 3/8” x 20”	F451TC-JCJC060806-20
5.	Adapter	8M22F87OMLO
6.	Adapter 90 Degree	4M12C87OMLO
7.	Adapter Run Tee	4 R6LO
8.	Adapter Run Tee	8 R6LO-S
9.	Adapter Test Port	PD34BTL
10.	Adapter Elbow	8 C6LO
11.	Adapter 45 Degree	8 V6LO-S
12.	Dust Cap	PD6-285
13.	Adapter Elbow	4 C6LO
14.	Adapter ORFS	4M14F87OMLO-S
15.	Cable Ties[a]	200-0467-01

Bracket Kit Components

Figure 1-4 Bracket Kit Components (PN: 152-0008-01)

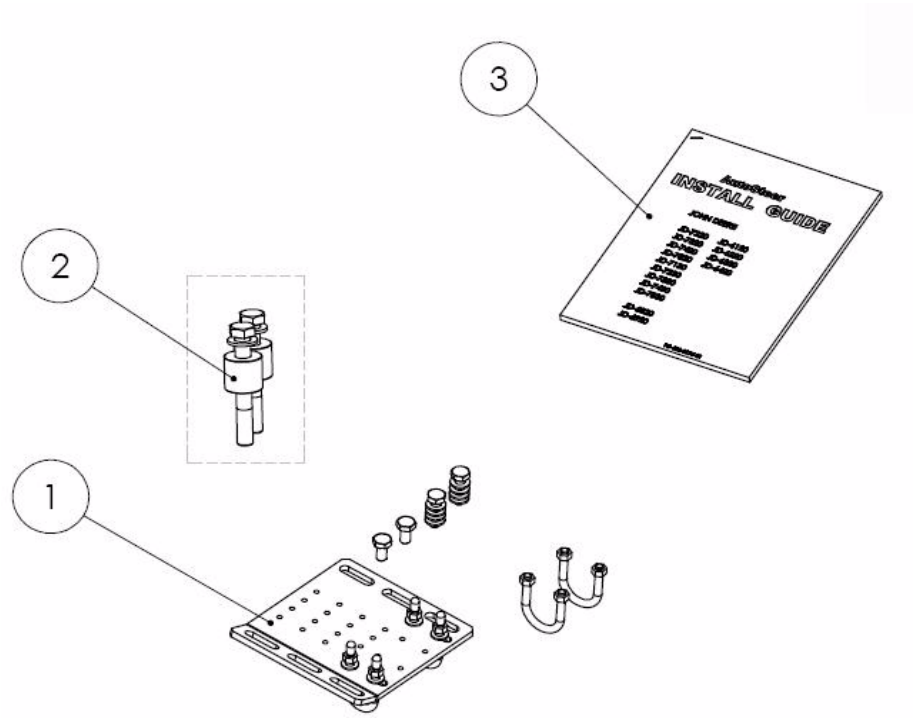


Table 1-4 Bracket Kit Components (PN: 152-0008-01)

Item	Component	Part Number
1.	Display Bracket Assembly	200-0469-02
2.	Roof Module Bracket Spacer Kit	200-0211-01
3.	Installation Guide	602-0196-01

Installation Procedure Outline

Note: The system interconnect cable diagram in the *Cable Diagram* on page 8 of this chapter shows the AutoSteer electrical connections.

1. Verify that all components have been received.

Note: *Step 2.* through *Step 5.* are skipped if installing an electric steering actuator.

2. Install the Hydraulic Valve Assembly.

3. Install the Hydraulic Hoses.

4. Install the Wheel Angle Sensor. (Optional)

5. Install the SA Module.

6. Install the Roof Rail on the cab roof.

7. Install the Roof Module on the roof rail.

8. Install the SA Module harness.

9. Install the main data harness.

10. Install the display using a RAM mount arm.

11. Connect the main harness to the display harness (Power + DB9 data)

Note: Instructions for connecting the vehicle kit cables to the display can be found in the display owner's manual.

12. Verify that all connectors are properly coupled and secured.

13. Start the vehicle and check for oil leaks.

14. Power ON the AutoSteer system.

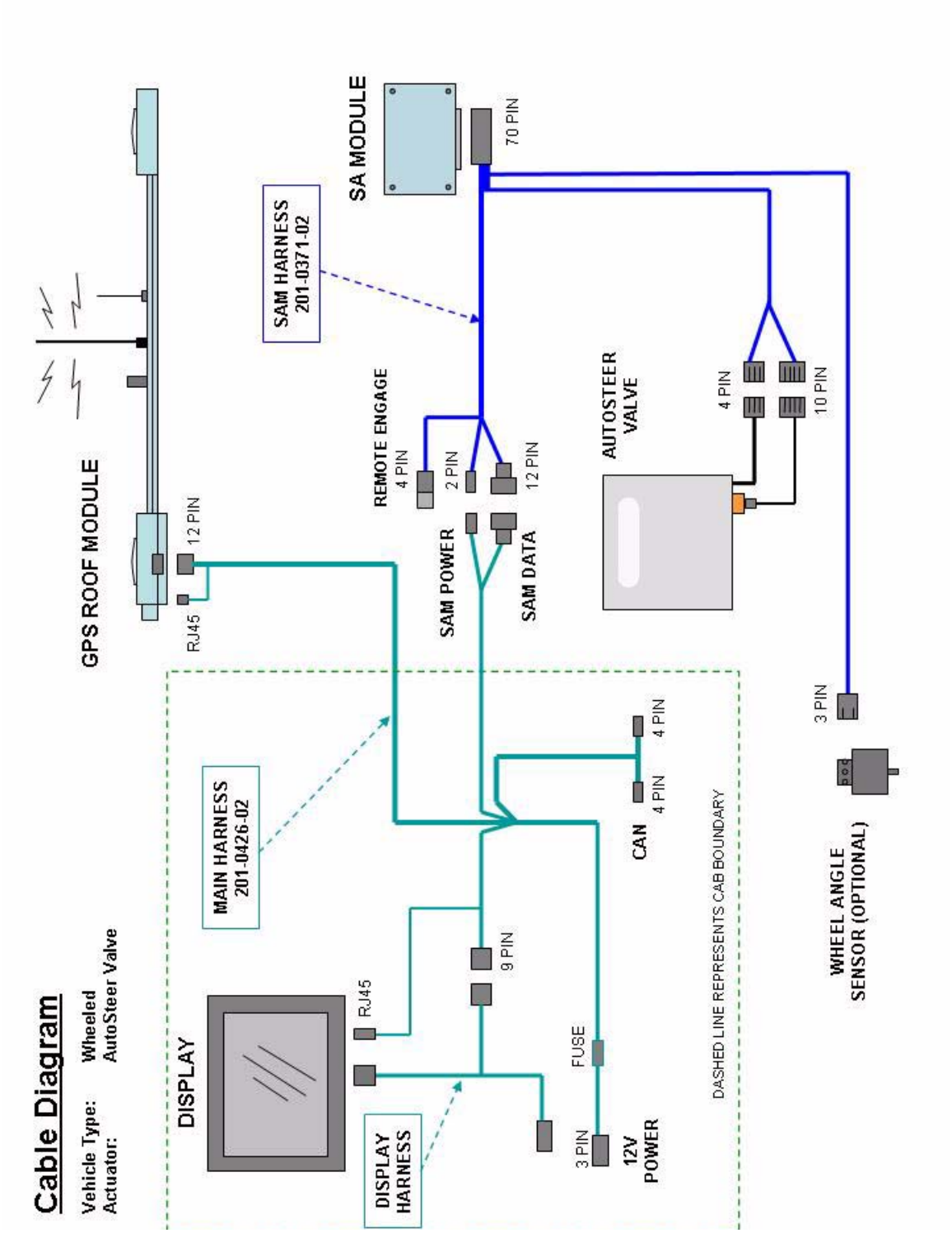
15. Adjust the pressure relief valve on the steering valve.

16. Calibrate the vehicle.

17. Tune the vehicle.

18. Verify the system has been installed properly and operates satisfactorily.

Cable Diagram



Steering Valve Installation

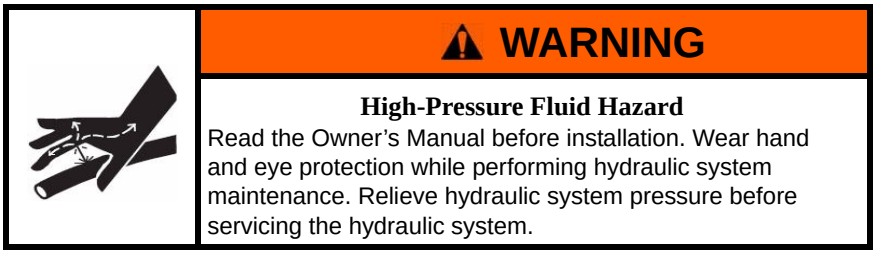
This **Steering Valve Installation** chapter information is provided in the following sections:

- *Steering Valve Installation Procedure Overview*
- *Verify a Power Beyond Kit Installation*
  - *Identifying Power Beyond Ports*
  - *Checking for Load Sense Shuttle Disk on 7X20 Series*
- *Prepare the Steering Valve for a Power Beyond Installation*
  - *Steering Valve Front Ports Overview*
  - *Valve Preparation Procedure*
- *Install the Steering Valve*
- *Hydraulic Hose Overview*
  - *Steering Valve Front Ports Overview*
  - *Hose Connection Overview*
- *Hydraulic Hose Connection Procedure*
  - *7X20 Series Power Beyond and Orbitrol LS Hydraulic Connections*
  - *7X30 Series Power Beyond and Orbitrol LS Hydraulic Connections*
  - *Attach Hoses from Power Beyond and LS Orbitrol Ports to the Steering Valve*
  - *Steering Line Hose Connection*
  - *Connect Pressure Transducer*
- *Pressure Relief Valve Adjustment*
- *Installation Checklist Before Proceeding to Startup*

Note: Only technicians trained for hydraulic valve installations should perform the installation procedures in this chapter. If your vehicle requires a hydraulic steering valve to be installed ensure a trained technician is available for the installation.

Steering Valve Installation Procedure Overview

1. Verify a power beyond kit has been installed on the vehicle.
2. Prepare the steering valve for a power beyond installation.
3. Install the steering valve bracket and valve on the vehicle.
4. Connect the six hoses between the steering valve and the vehicle.
5. Check for oil leaks.
6. Perform a manual functional test to confirm correct valve operation.


WARNING
High-Pressure Fluid Hazard
Read the Owner's Manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

Verify a Power Beyond Kit Installation

Identifying Power Beyond Ports

This installation requires that a power beyond kit be installed on the vehicle prior to installing the steering valve. The power beyond kit provides the required ports for pressure, return, and load sense. The 7X20 and 7X30 series have a different configuration for the power beyond ports. The most common power beyond for the 7X20 series is shown in *Figure 2-1* and the most common power beyond for the 7X30 is shown in *Figure 2-2*. The pictures show the rear of the tractors near the selective control valve area. There is the possibility of alternative power beyond connections. *Figure 2-3* shows one possible configuration. Always check the vehicle's owner's manual for the exact configurations and port identifications of the power beyond kit.

Figure 2-1 Normal Power Beyond Location on 7X20 Models

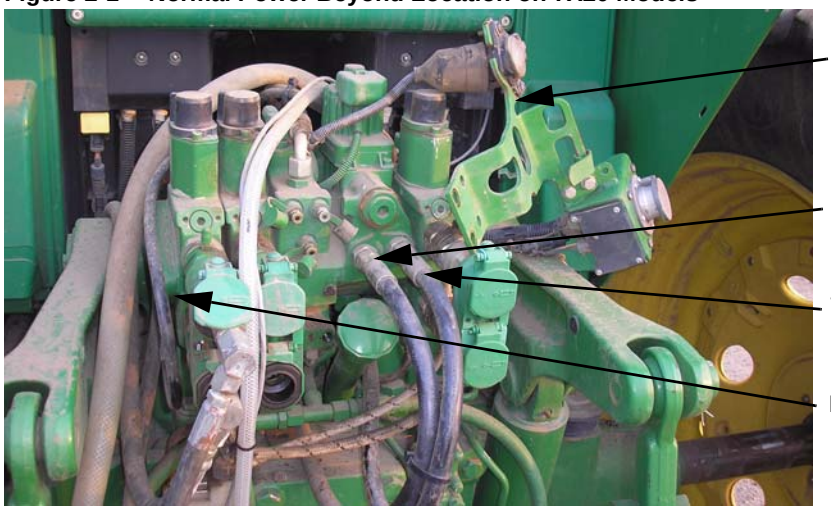

Electrical Connection Bracket (Note that this bracket has been moved to show a better view of the ports.)
Pressure
Tank/Return
Load Sense

Figure 2-2 Normal Power Beyond Location on 7X30 Models

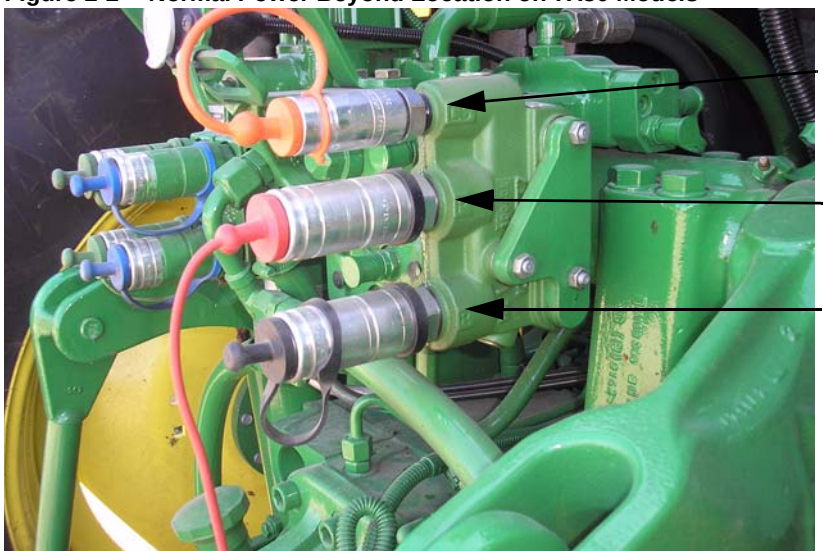
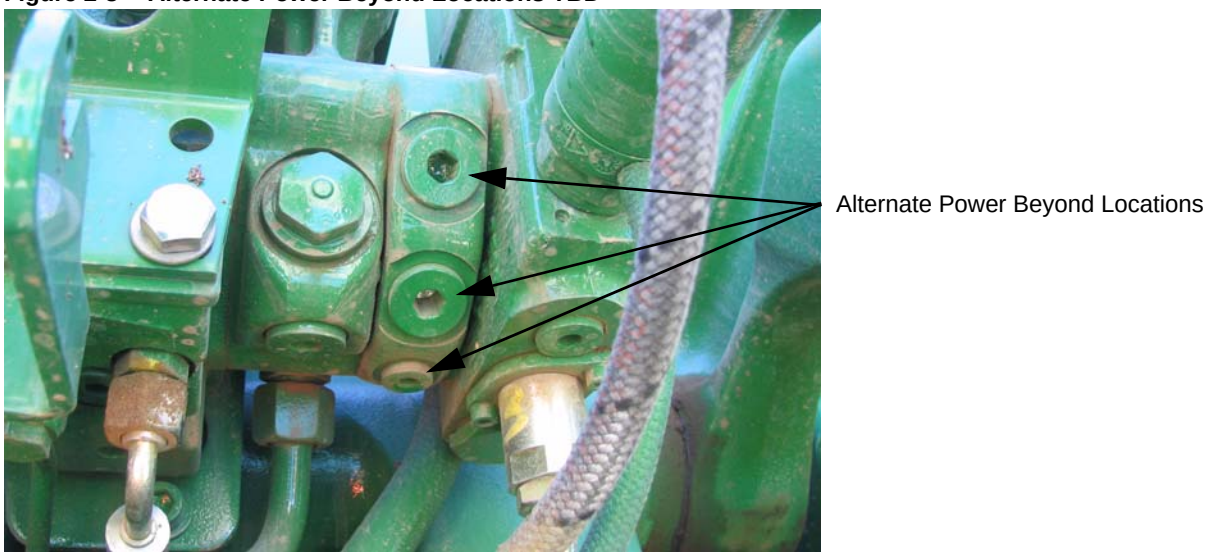


Figure 2-3 Alternate Power Beyond Locations TBD



Checking for Load Sense Shuttle Disk on 7X20 Series

If the system and the AutoSteer system reacts sluggishly after installation on a 7X20 series vehicle, it may be because the load sense shuttle disk has not been installed inside the load sense plate. This plate is supposed to have a small round shuttle disk installed in order to make the load sense work properly. Without this shuttle disk, the AutoSteering will be erratic. It may appear to work with no hydraulic load on the system, but if conditions become challenging for the hydraulic system (i.e.; Hydraulic remotes engaged three-point lifting, etc.) the steering performance will degrade.

A John Deere technician must perform this procedure.

Prepare the Steering Valve for a Power Beyond Installation

Prior to installing the steering valve on to the vehicle, the valve must be configured for use on a power beyond system. This requires the installer to verify the proper plugs and orifices have been installed in the access ports on the valve. This process can be performed after the valve has been installed on the vehicle; however it is much easier to do this prior to the installation.

Steering Valve Front Ports Overview

Figure 2-4 shows the ports on the front of the valve that will be accessed after the front cover has been removed to prepare the valve for a power beyond installation. There are other ports and orifices on the valve, but the ones described here are the only ones that will need to be modified for a power beyond installation. The rest can be ignored for this installation. *Table 2-2* shows the factory default positions of all the access ports and the positions they should be in for a power beyond installation. Ports 13A and 13C are not accessed in this installation and are thus not identified in *Figure 2-4*.

Figure 2-4 Ports on the Front of Steering Valve

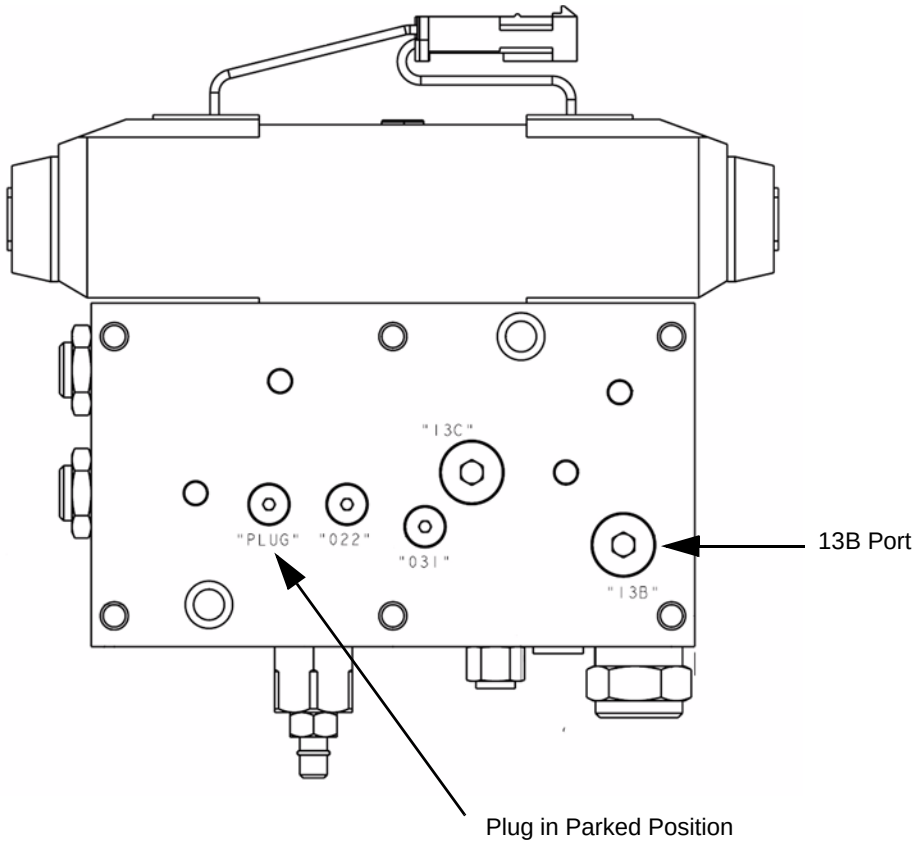


Table 2-1 Plug and Orifice Configuration Summary

Type of Installation	13A	13B	13C
Factory Default Configuration	Plug	Open	Plug
Power Beyond Configuration	Plug	Plug	Plug

Valve Preparation Procedure

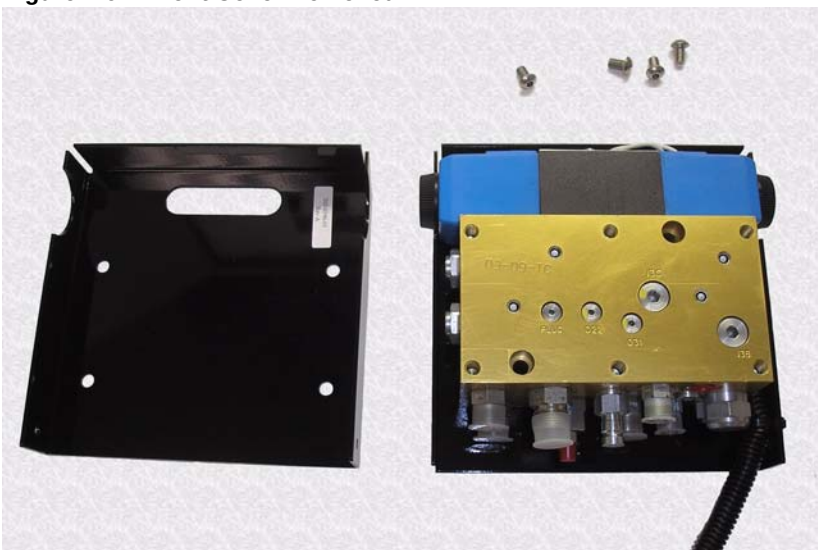
1. Place the steering valve on a flat surface. Remove the four cover screws with a 3/16" Allen wrench. See *Figure 2-5*.

Figure 2-5 Remove Front Panel Screws Steering Valve

WARNING
HIGH PRESSURE FLUID HAZARD
• READ INSTRUCTION MANUAL BEFORE INSTALLING
• RELIEVE SYSTEM PRESSURE BEFORE SERVICING
• WEAR HAND AND EYE PROTECTION

2. Remove the front cover and screws and save them for the final reassembly after the valve has been installed on the vehicle. See *Figure 2-6*.

Figure 2-6 Front Cover Removed

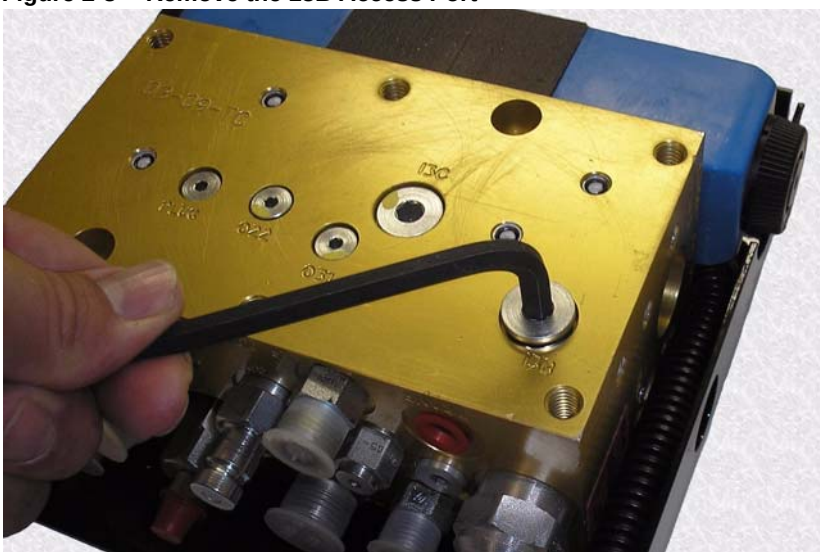


3. Locate the Plug stored in the valve body and remove it with a 1/8" Allen wrench. See *Figure 2-7*.

Figure 2-7 Remove Plug from the Valve Body

4. Locate the 13B port on the valve and remove the access port with a 1/4" Allen wrench. See *Figure 2-8*.

Figure 2-8 Remove the 13B Access Port

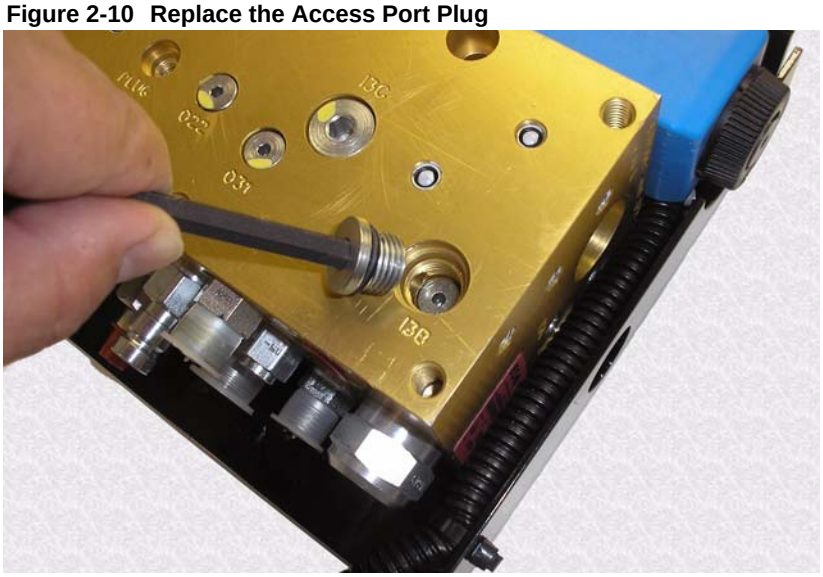


5. Install the Plug removed in Step 3 into the bottom of port 13B and tighten it with a 1/8" Allen wrench. See *Figure 2-9*.

Figure 2-9 Install the Plug into Port 13B

6. Replace the access port plug and tighten with a 1/4" Allen wrench. See *Figure 2-10*. The valve is now ready to install on the vehicle.

Figure 2-10 Replace the Access Port Plug



Note: The plug in position 13A may need to be replaced with a 0.022" orifice if the vehicle's hydraulic pump does not stroke down after the AutoSteer system disengages. Perform a verification of this function after installing the AutoSteer system. The optional 0.022" orifice works as a load sense bleed-down path for the AutoSteer load sense signal if the vehicle's load sense bleed down does not work properly or does not exist.

Install the Steering Valve

The AutoSteer valve is installed on the right side of the vehicle's frame just ahead of the cab in the position shown in *Figure 2-11*. A universal valve bracket is secured to the vehicle using the existing bolts on the vehicle.

Figure 2-11 John Deere 7X20 and 7X30 AutoSteer Valve Mounting Location

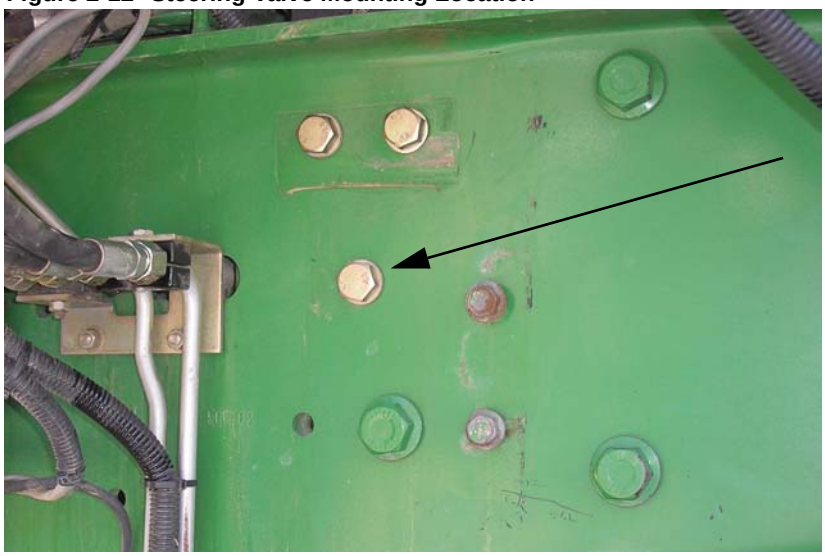
1. Locate the three bolts in a triangular pattern on the right side frame under the cab. See *Figure 2-12*.

Note: Only the bottom bolt will be used to secure the valve bracket.

⚠ WARNING

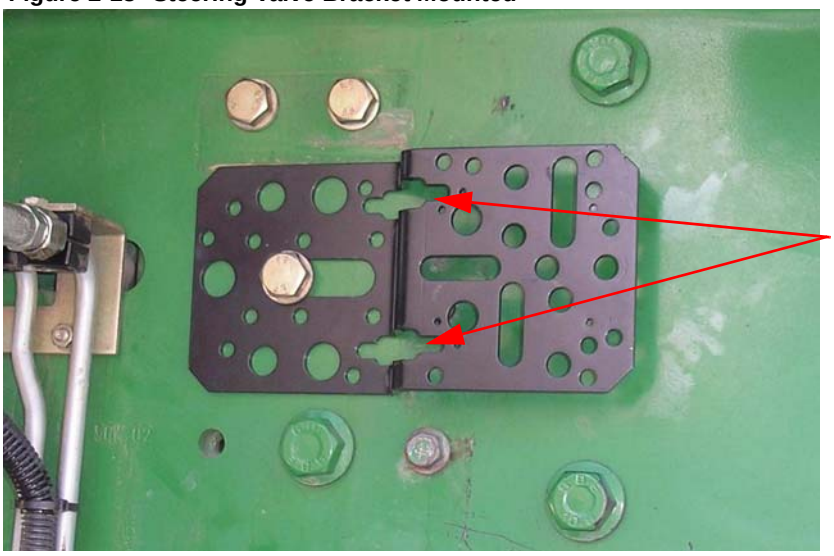
Do not remove all three bolts simultaneously. The three bolts support the cab. The cab will drop and can cause injury if they are all removed at the same time.

Figure 2-12 Steering Valve Mounting Location



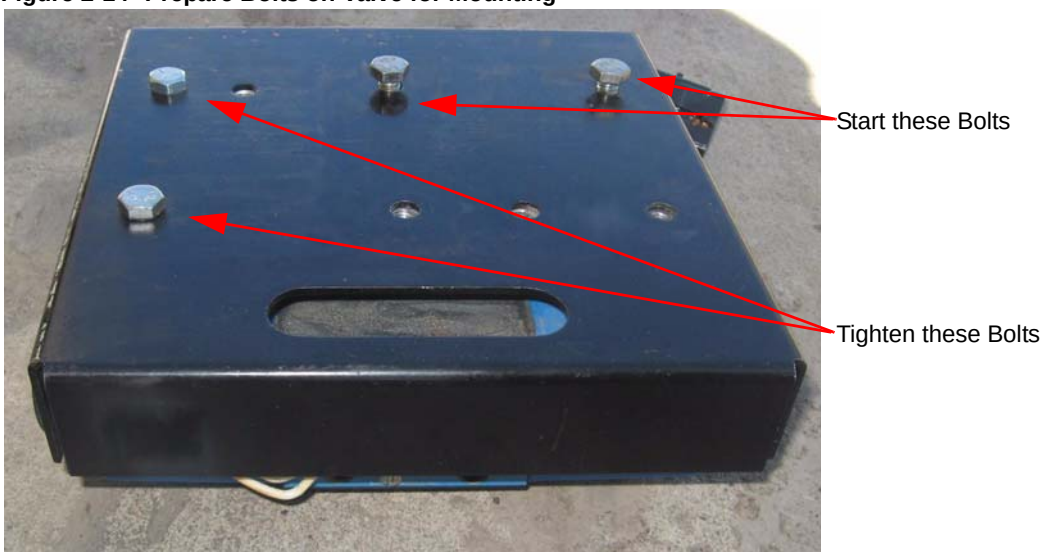
2. Remove the bottom bolt with a 21mm socket and ratchet. A breaker bar may be necessary to loosen the bolt.
3. Install the valve bracket in the position shown in *Figure 2-13*. Tighten the bolt to 175ft-lbs. (240 Nm).

Figure 2-13 Steering Valve Bracket Mounted



4. Start two of the bolts for mounting the steering valve to the valve block as shown in *Figure 2-14*. Allow enough space for the bolt heads to slide into the slots on the mounting bracket shown in *Figure 2-13*.

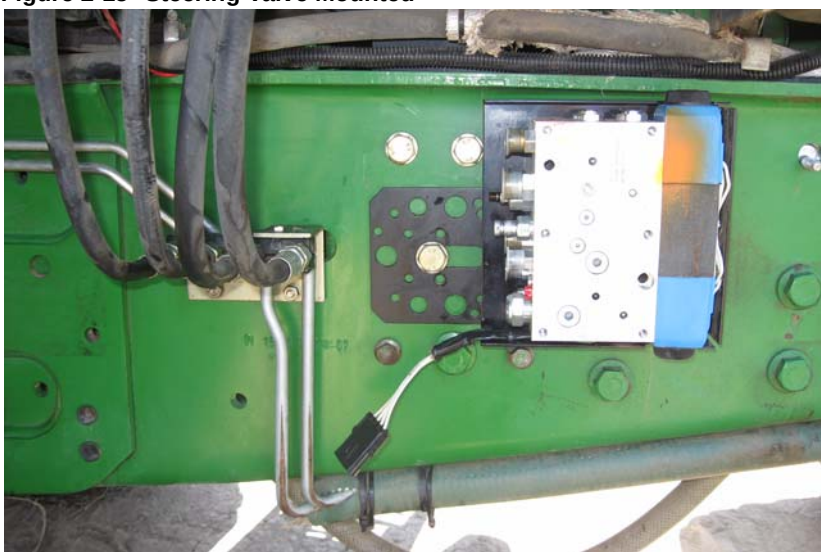
Figure 2-14 Prepare Bolts on Valve for Mounting



Note: Tightened the two bolts on the left to hold the cover firmly on the valve block while installing. Prior to tightening the bolts, verify the cover is centered so that the other holes on the cover will allow a bolt to screw in easily.

5. Slide the valve into the mounted position as shown in *Figure 2-15*.

Figure 2-15 Steering Valve Mounted



6. Secure the valve to the bracket with the other two 5/16" bolts.

7. Tighten the four bolts using a 1/2" ratchet wrench. The valve is now installed.

Hydraulic Hose Overview

Steering Valve Port Overview

The steering valve has six ports that need to be connected to the vehicle. The ports are shown in *Figure 2-16* and the connection for each is described in *Table 2-2*.

Figure 2-16 Steering Valve Ports

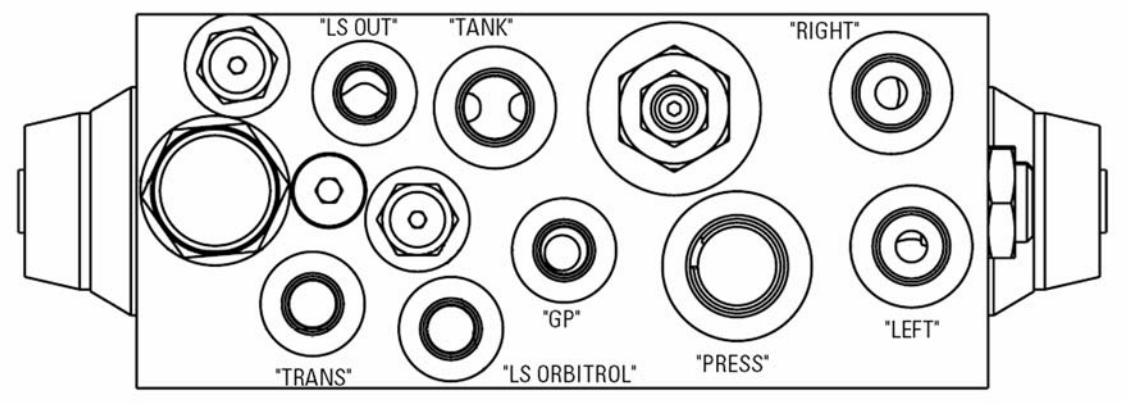


Table 2-2 Valve Functions and Fitting Sizes

Valve Label	Function	Fitting Type/Size
PRESS	Pressure (From Power Beyond)	-8 ORFS
TANK	Tank / Return (From Power Beyond)	-6 ORFS
LS ORBITROL	Load Sense From Orbitrol Line	-4 ORFS
LS OUT	Load Sense (From Power Beyond)	-4 ORFS
LEFT	Left Steering Cylinder	-6 ORFS
RIGHT	Right Steering Cylinder	-6 ORFS
GP	Diagnostics Port	1/8" Coupler Nipple (SAE J1502)
TRANS	Pressure Transducer	-4 SAE ORB

Hose Connection Overview

Figure 2-17 shows an overview on how the hose connections are to be attached. The PRESS, TANK, and LS OUT ports will be connected to the power beyond connections. The LS ORBITROL port will be connected to the load sense line that detects when the steering orbitrol is enabled. The LEFT and RIGHT ports will be teed into the corresponding lines on the steering cylinders that cause the vehicle to turn left or right.

Table 2-3 shows the list of hoses provided by the installation kit. The kit also provides colored cable ties. To ensure the right hose is attached to the right port on both sides, attach the colored cable tie shown in the table to each end of the hose listed.

The numbers in *Figure 2-17* and *Table 2-3* correspond to the Item Numbers for each hose provided in *Figure 1-3* on page 4. If the number has a "-#" after it, it means that there are multiple hoses with the same length and fittings.

Figure 2-17 Power Beyond Hydraulic Connection Diagram

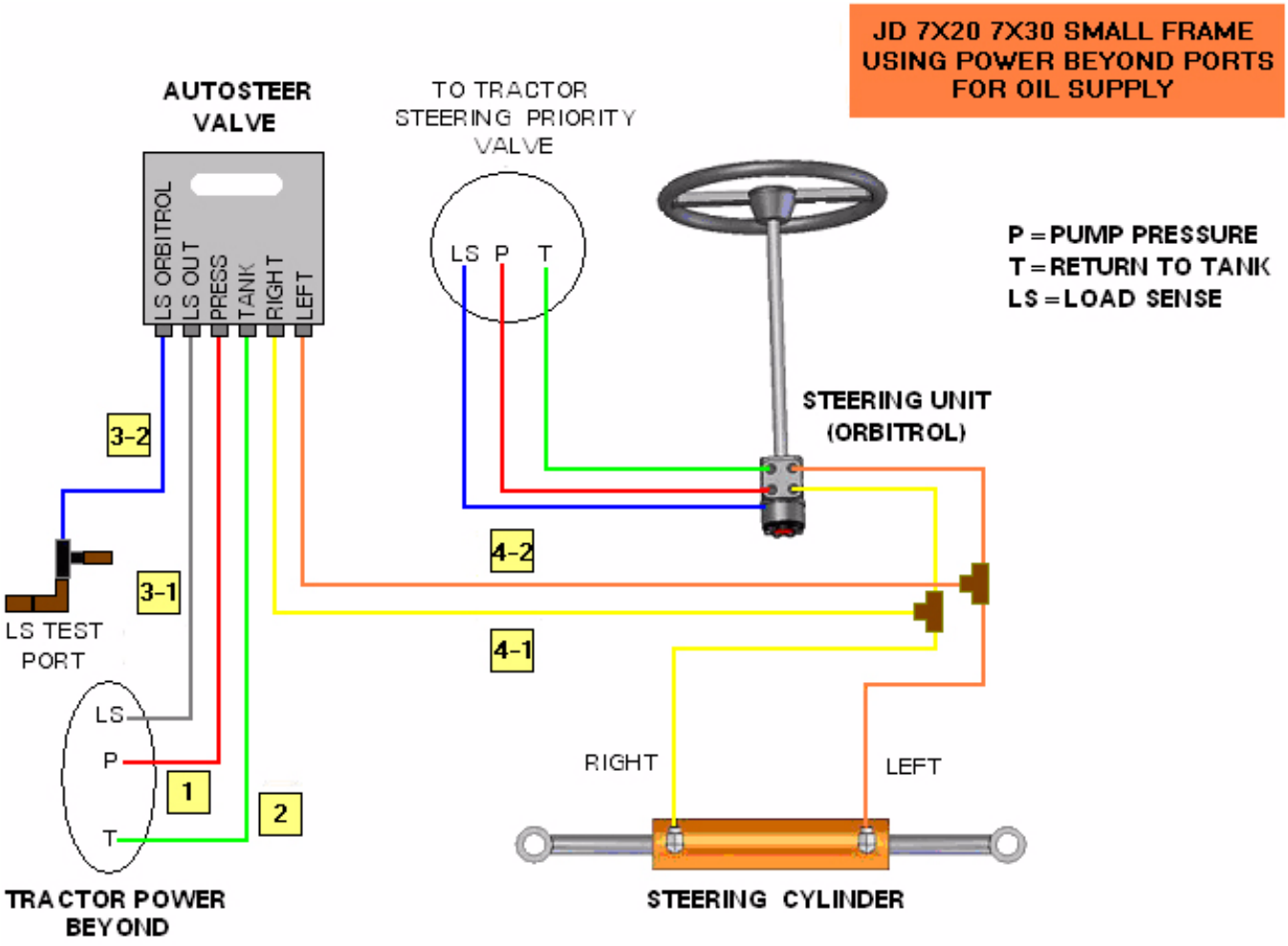


Table 2-3 Color Codes for Hydraulic Hoses

Valve Port Hose	Color	Item Number from Hose Kit	Notes
PRESSURE	Red	1	3/8" hose with a #8 ORF connector
TANK	Green	2	3/8" hose with a #6 ORF connector
LS ORIBITROL	Blue	3-1	1/4" hose
LS OUT	Grey	3-2	1/4" hose
RIGHT	Yellow	4-1	3/8" hose
LEFT	Orange	4-2	3/8" hose

Hydraulic Hose Connection Procedure

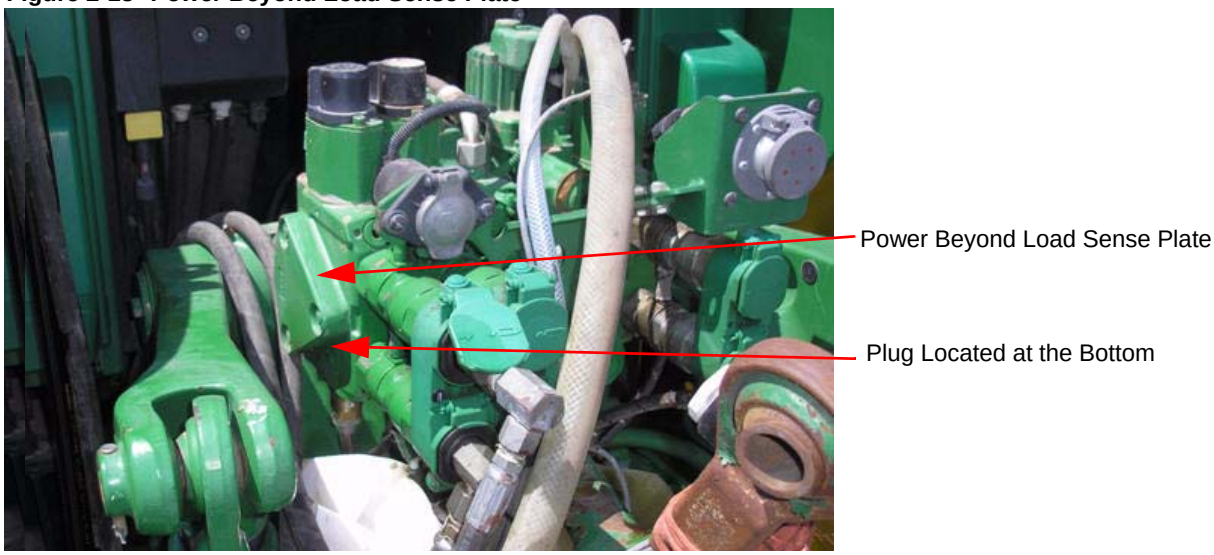
Note: Due to limited space in the steering valve port area, the hoses should be connected in the order provided by this installation manual to reduce installation problems. Refer to the hose diagram in *Figure 2-17* for information on connecting the correct hydraulic hose to the correct ports on the vehicle and steering valve.

The power beyond and LS Orbitrol connections for the 7X20 and 7X30 series vehicles are different. Follow the specific instructions for the vehicles described. If the vehicle has a power beyond configuration different than what is described in this manual, follow the operator's manual for the vehicle to determine which ports to connect to and modify the procedure accordingly.

7X20 Series Power Beyond and Orbitrol LS Hydraulic Connections

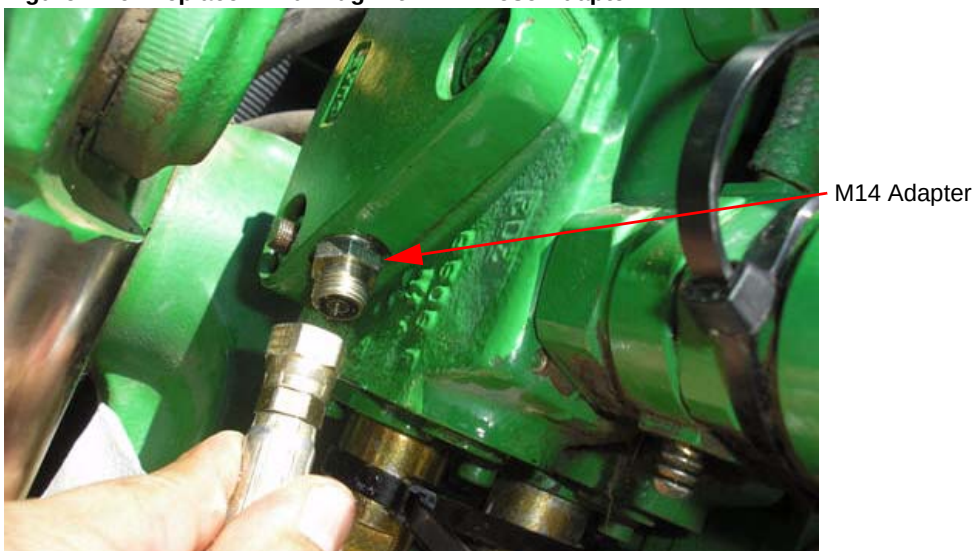
1. Locate the load sense plate on the left side of the vehicle's hydraulic stack. See *Figure 2-18*.

Figure 2-18 Power Beyond Load Sense Plate



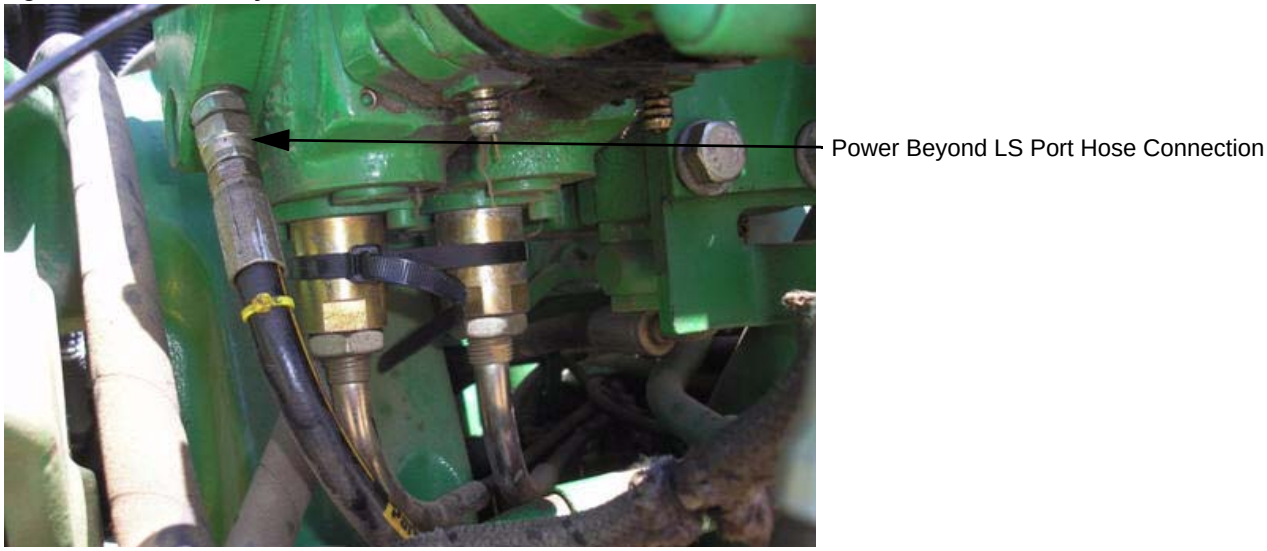
2. Remove the blind plug on the bottom side of the plate with a 21 mm socket and ratchet.
3. Install a M14 hose adapter provided in the hose kit. Tighten the adapter with a 3/4" wrench. See *Figure 2-19*.

Figure 2-19 Replace Blind Plug with M14 Hose Adapter



4. Connect a 1/4" hose to the power beyond load sense port as shown in *Figure 2-20*. Tighten the hose connection with an 11/16" wrench.

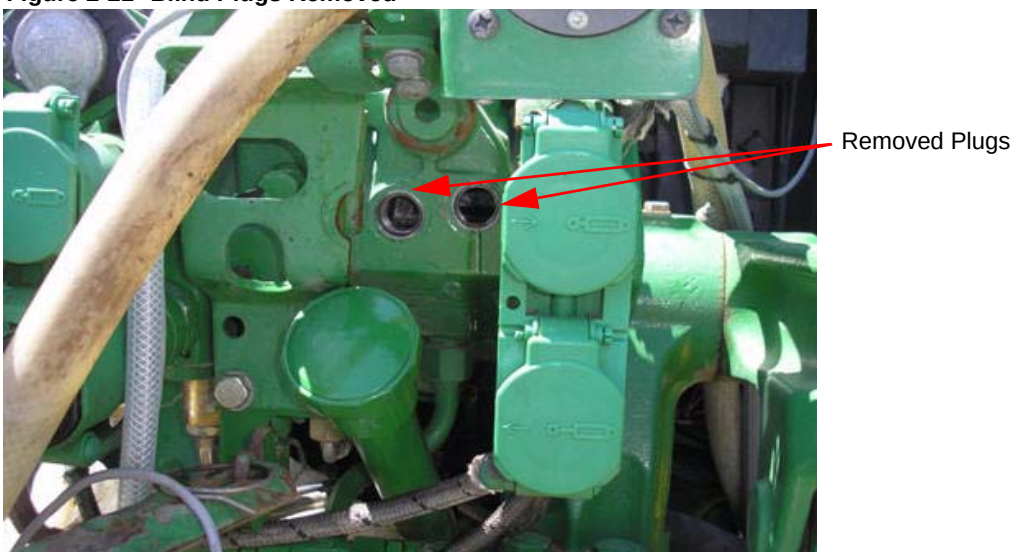
Figure 2-20 Power Beyond Load Sense Port Hose Connection



5. Route the hose under the three point pivot point, under the right side of the cab, and towards the right, front side of the cab where the steering valve is mounted.
6. Locate the pressure and return ports on the back of the vehicle for the power beyond. Remove the existing blind plugs with a 10 mm Allen wrench. See *Figure 2-21*.

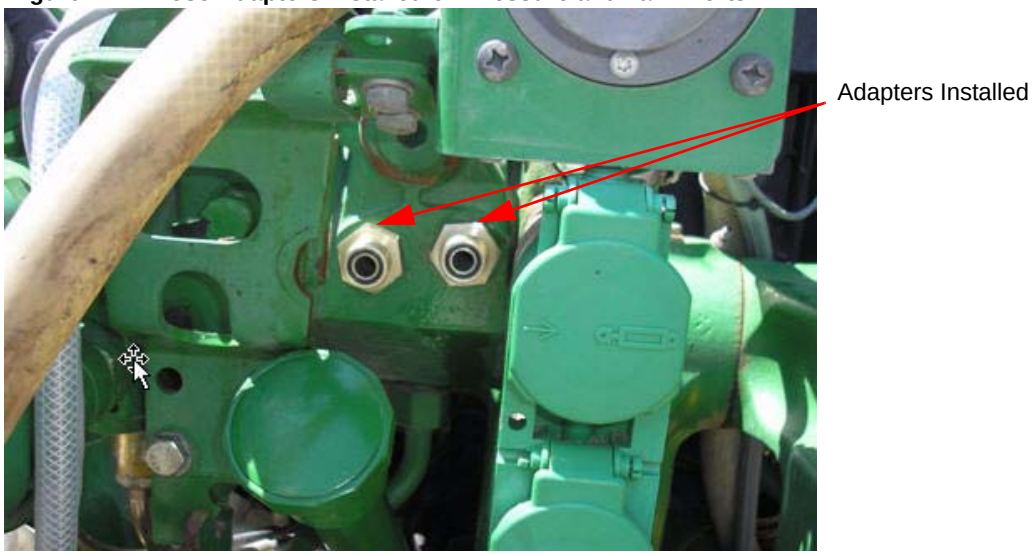
Note: On some vehicles, these ports may have quick couplers installed. Remove the quick couplers if necessary to complete the installation.

Figure 2-21 Blind Plugs Removed



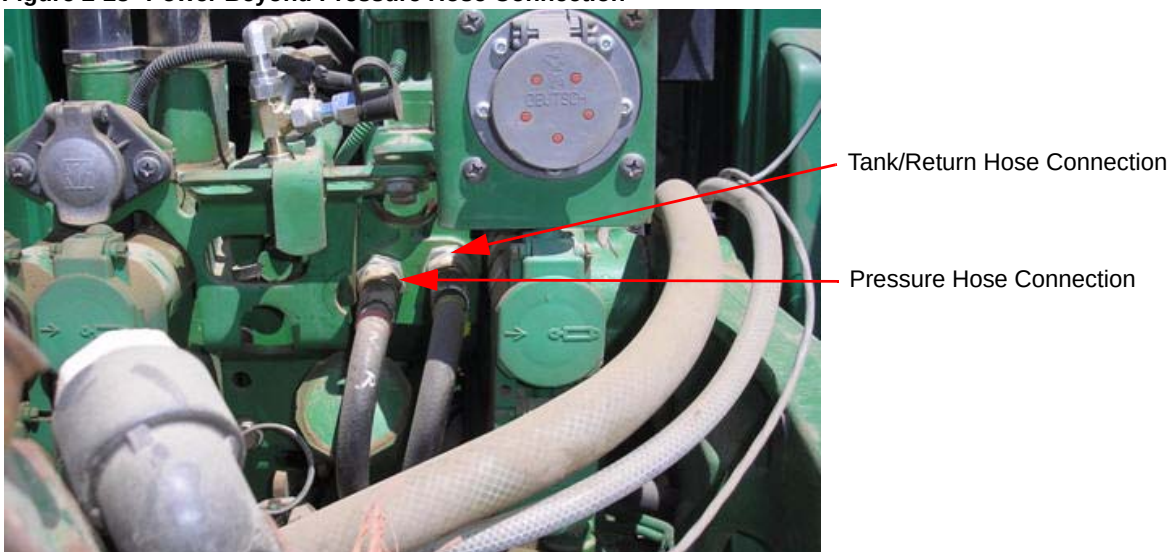
7. Install the two M22 hose adapter on each port as shown in *Figure 2-22*. Tighten the adapters with a 1-1/16" wrench.

Figure 2-22 Hose Adapters Installed on Pressure and Tank Ports



8. Connect the tank hose to the right hose adapter as shown in *Figure 2-23*.
9. Connect the pressure hose to the left hose adapter as shown in *Figure 2-23*.
10. Tighten both of the connections with a 15/16" wrench.

Figure 2-23 Power Beyond Pressure Hose Connection

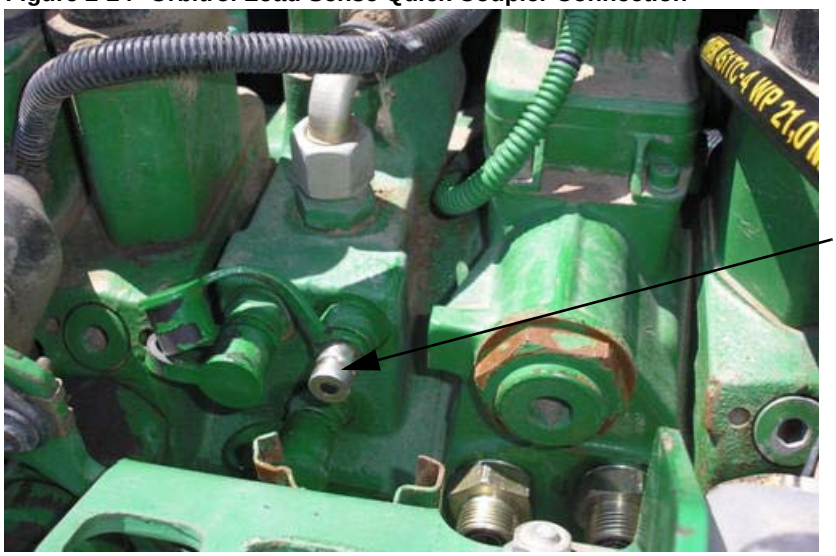


11. Route the hoses under the three point pivot point, under the right side of the cab, and towards the right, front side of the cab where the steering valve is mounted.

12. Locate the diagnostics quick coupler on the rear of the vehicle shown in *Figure 2-24*.

Note: This coupler senses the steering load sense pressure and is used to get a pressure signal for AutoSteer manual kick-out.

Figure 2-24 Orbitrol Load Sense Quick Coupler Connection



13. Remove the test port quick coupler with a 3/4" wrench.

14. Install the M14 adapter to the open port. Tighten the adapter with a 3/4" wrench.

15. Connect a -4 ORF 90 degree elbow adapter to the port. Point the elbow up.

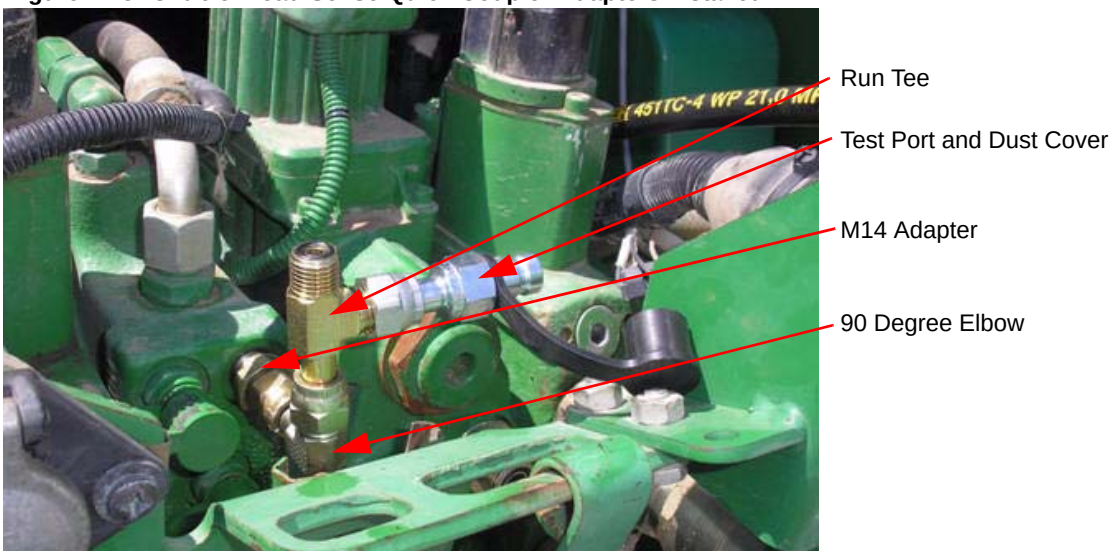
16. Connect a -4 ORF run tee to the elbow adapter. Point the tee to the right of the vehicle.

17. Connect the new test port adapter provided with the install kit to the side of the tee

18. Attach the dust cover to the test port. See *Figure 2-25* for an example of this assembly.

Note: The test port adapter coupler provided in the hose kit maintains the test port functionality after the AutoSteer installation is completed.

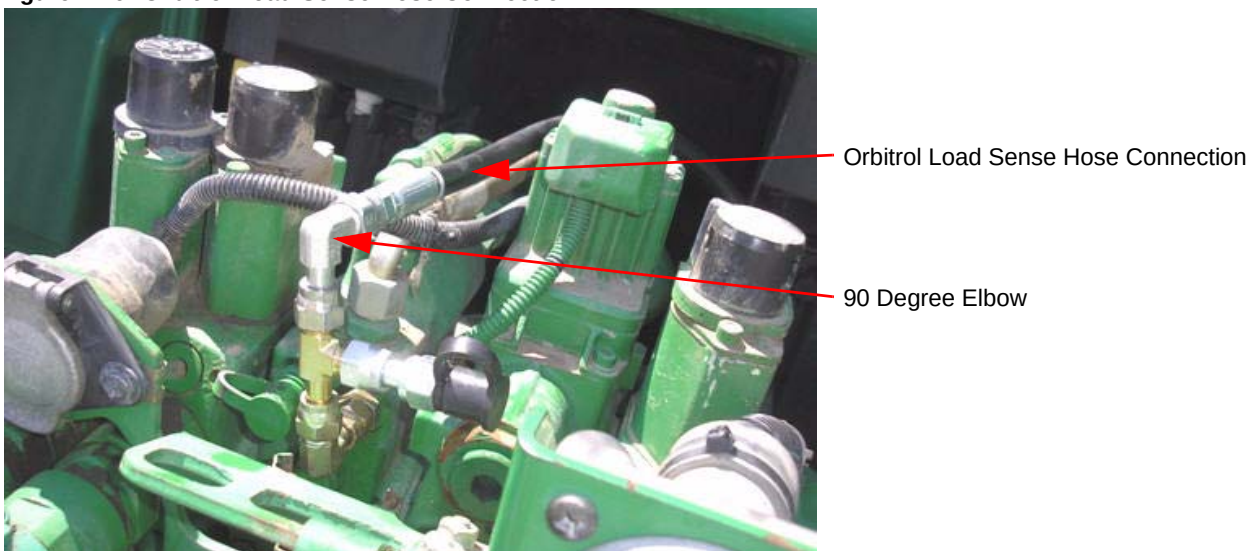
Figure 2-25 Orbitrol Load Sense Quick Coupler Adapters Installed



19. Attach another -4 ORF 90 degree elbow adapter to the top of the run tee. Point the elbow towards the front of the vehicle.

20. Connect a 1/4" hose from the elbow as shown in *Figure 2-26*.

Figure 2-26 Orbitrol Load Sense Hose Connection



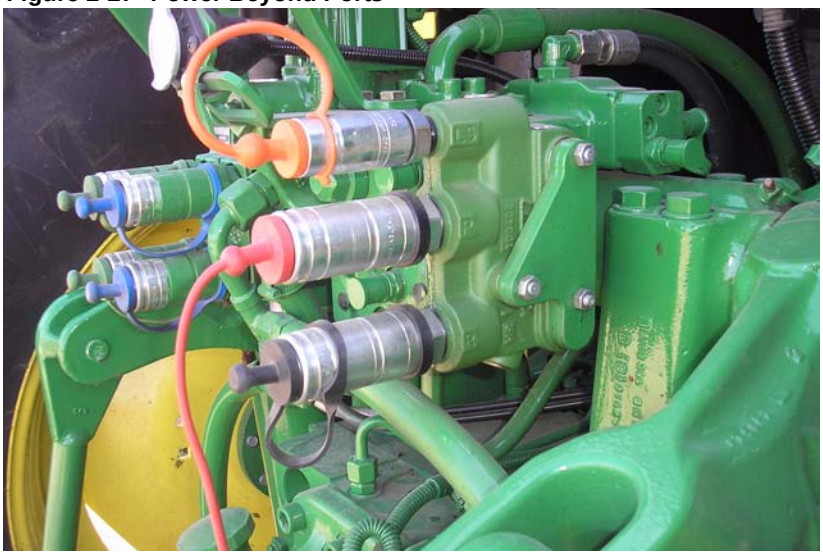
21. Tighten all the hose adapter connections in the assembly with a 11/16" wrench.

7X30 Series Power Beyond and Orbitrol LS Hydraulic Connections

1. Locate the power beyond ports on the rear of the vehicle. See *Figure 2-27*.

Note: The power beyond may have blind plugs instead of adapters. If so remove the blind plugs.

Figure 2-27 Power Beyond Ports



2. Remove the power beyond load sense, pressure, and tank, couplers as shown in *Figure 2-28*.

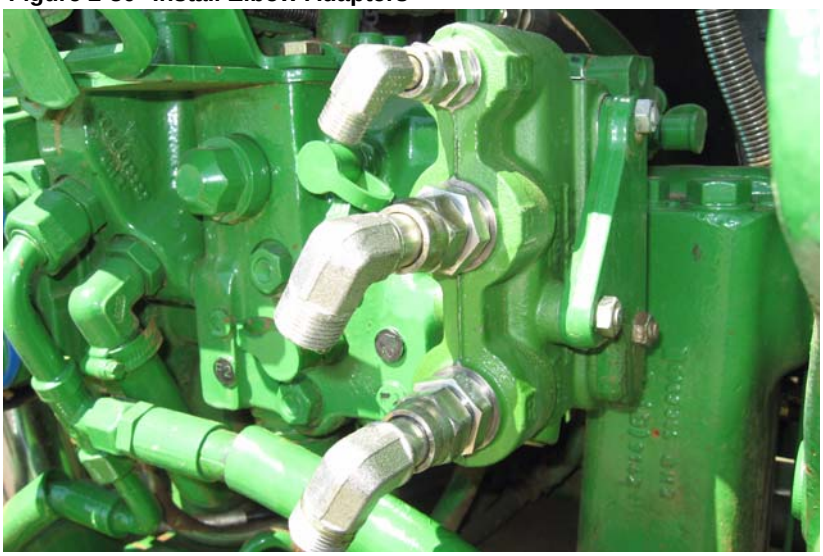
Figure 2-28 Power Beyond Ports Shown Removed

3. Install two M22 hose adapter in the pressure and tank ports and tighten with a 1-1/16" wrench. Install a M14 hose adapter in the load sense port and tighten with a 3/4" wrench. See *Figure 2-29*.

Figure 2-29 Adapters Installed in Ports

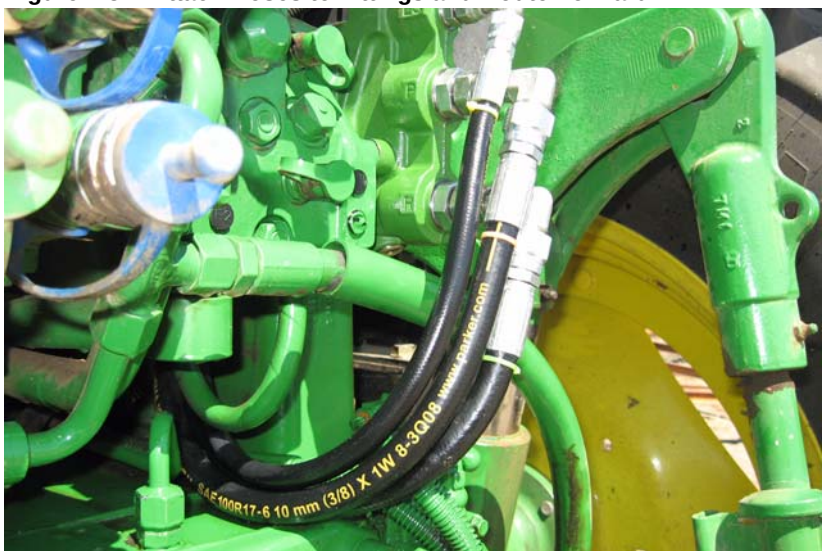
4. Attach two -8 ORF 90 degree elbows to the pressure and tank ports and tighten with a 15/16" wrench. Attach a -4 ORF 90 degree elbow to the load sense port and tighten with a 11/16" wrench. See *Figure 2-30*. Point the adapters down and to the left.

Figure 2-30 Install Elbow Adapters



5. Attach a 1/4" hose to the load sense port. Attach a 3/8" hose with two -8 ORF fittings to the pressure port and a 3/8" hose with one -8 ORF fitting and one -6 ORF fitting to the tank port as shown. Tighten the 1/4" hose with an 11/16" wrench and tighten the 3/8" hoses with a 15/16" wrench.
6. Route the hoses under the three port pivot point, under the cab, and up toward the right, front corner of the cab where the steering valve is. See *Figure 2-31*.

Figure 2-31 Attach Hoses to Fittings and Route Forward



7. Locate the diagnostics quick coupler on the left side of the valve stack on the rear of the vehicle. The port is on the cab side of the valve stack.

Note: This coupler senses the steering load sense pressure and is used to get a pressure signal for AutoSteer manual kick-out.

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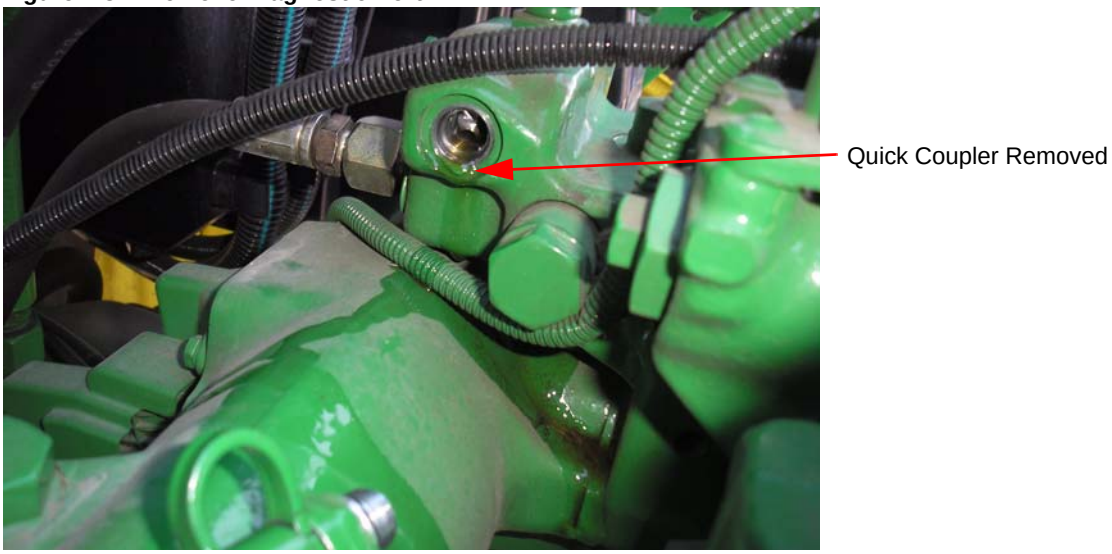
8. Remove the quick coupler with a 3/4" wrench as shown in *Figure 2-32*.

Figure 2-32 Remove Diagnostic Port

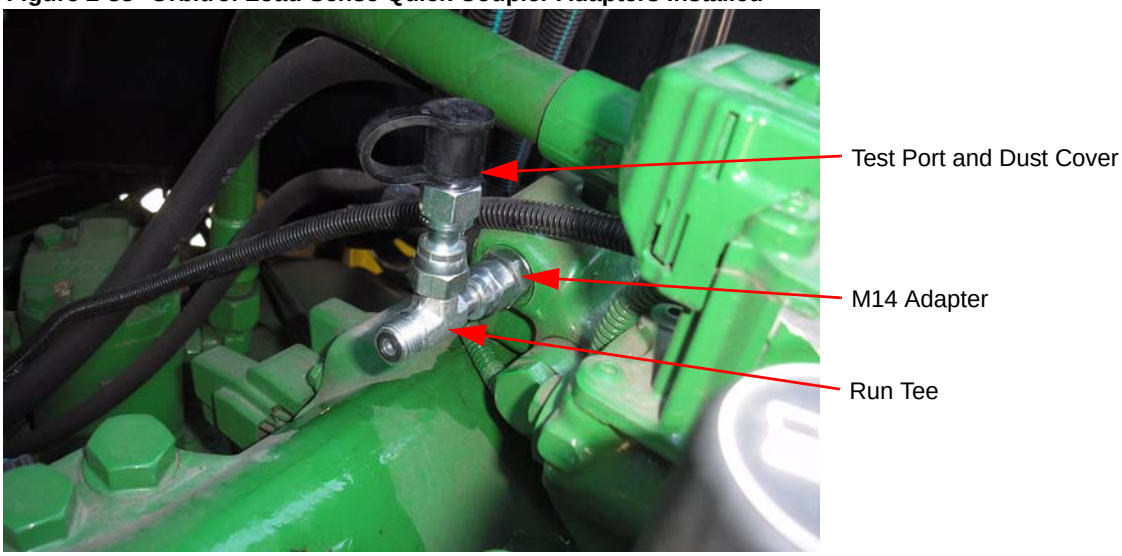


9. Install a M14 adapter to the open port. Tighten the adapter with a 3/4"wrench.
10. Connect a run tee to the elbow adapter. Point the tee up.
11. Connect the new test port adapter provided with the install kit to the top of the tee

12. Attach the dust cover to the test port. See *Figure 2-33* for an example of this assembly.

Note: The test port adapter coupler provided in the hose kit maintains the test port functionality after the AutoSteer installation is completed.

Figure 2-33 Orbitrol Load Sense Quick Coupler Adapters Installed



13. Attach a 1/4" hose to the end of the run tee as shown in *Figure 2-34*. Route the hose under the cab up to the right, front corner of the cab where the steering valve is.

Figure 2-34 Orbitrol Load Sense Hose Connection

14. Tighten the hose and all the adapters with an 11/16" wrench.

Attach Hoses from Power Beyond and LS Orbitrol Ports to the Steering Valve

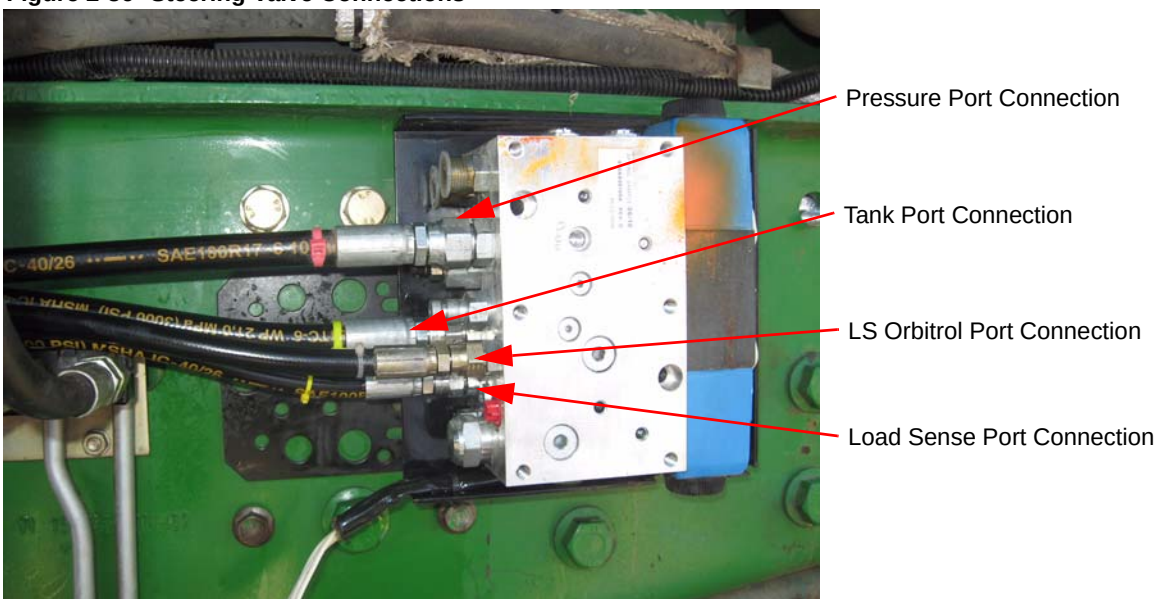
1. Route the hose under the right side of the cab and towards the right, front side of the cab where the steering valve is mounted as shown in *Figure 2-35*.

Figure 2-35 Route Hoses to Valve Area

2. Attach the hose from the power beyond load sense port on the back of the vehicle to the LS OUT port of the steering valve Tighten with an 11/16" wrench.
3. Attach the hose from the power beyond tank port on the back of the vehicle to the TANK port on the steering valve. Tighten with a 13/16" wrench.
4. Attach the hose from the orbitrol load sense tee on the back of the vehicle to the LS ORBITROL port on the steering valve. Tighten with an 11/16" wrench.

5. Attach the hose from power beyond pressure port on the back of the vehicle to the PRESS port on the steering valve. Tighten with a 15/16" wrench. See *Figure 2-36*.

Figure 2-36 Steering Valve Connections



Steering Line Hose Connection

1. Locate the area where the steer rubber hoses connect to the metal steer lines under the right front cab near the steering valve as shown in *Figure 2-37*.

Note: The AutoSteer steer hose connections are the two hoses on the right. The two similar hoses on the left are for power brakes and must not be touched.

Figure 2-37 Steer Line Connection Location

2. Disconnect the two steer lines at the fitting under the right front side of the cab near the steering valve with a 15/16" and 7/8" open end wrenches. See *Figure 2-38*.

Note: The right steer line is actually the left connector of the two steer lines and the left steer line is actually the right connector of the two steer lines.

Note: When the lines are disconnected, there will be oil that leaks out. Ensure a collection bucket is placed under the lines before removing them to collect the lost oil.

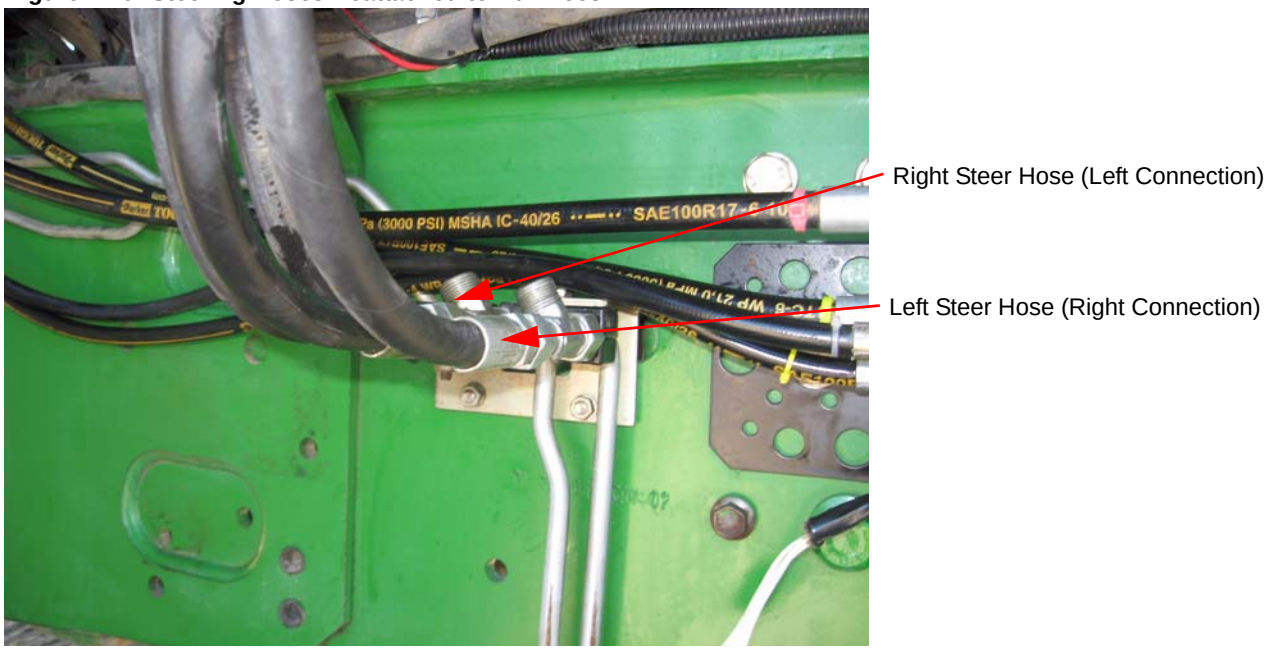
Figure 2-38 Steer Lines Removed

3. Attach a -8 ORF run tee adapter to both of the fittings on the vehicle tee port pointing upward.

Figure 2-39 Attach Run Tees

4. Reattach the right steering hose to the run tee (the left connector) as shown in *Figure 2-40*.
5. Reattach the left steering hose to the run tee (the right connector) as shown in *Figure 2-40*.

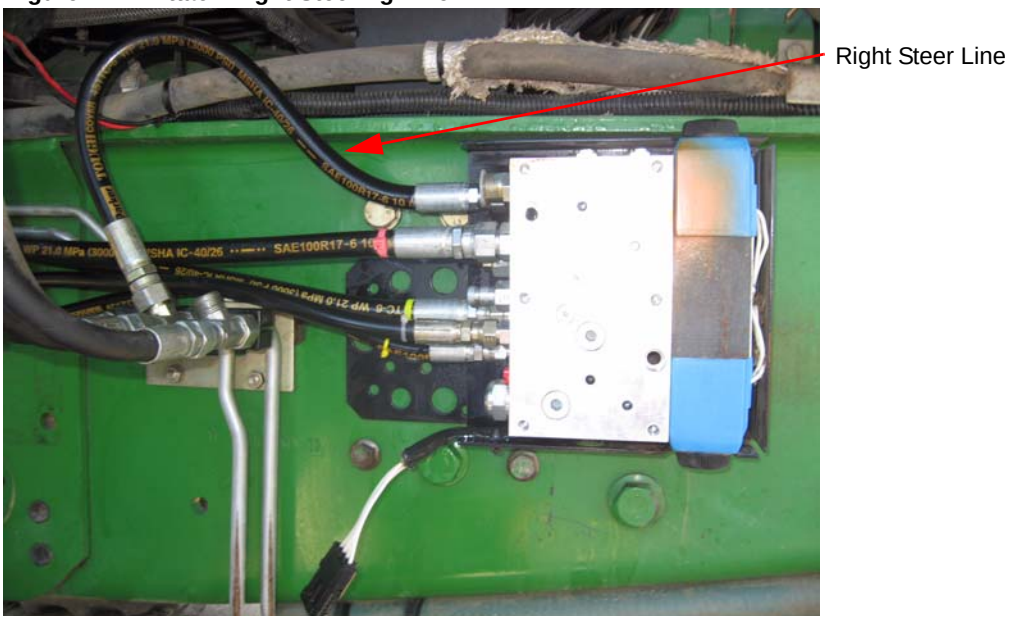
Figure 2-40 Steering Hoses Reattached to Run Tees



6. Attach the 3/8" hose from the installation kit to the top port of the left run tee.
7. Attach the other end of the hose from the steer right line to the RIGHT port on the steering valve as shown in *Figure 2-41*. Tighten the hose and adapter connections with a 13/16" wrench.

8. Tighten the adapters and original hose connections with a 15/16" wrench.

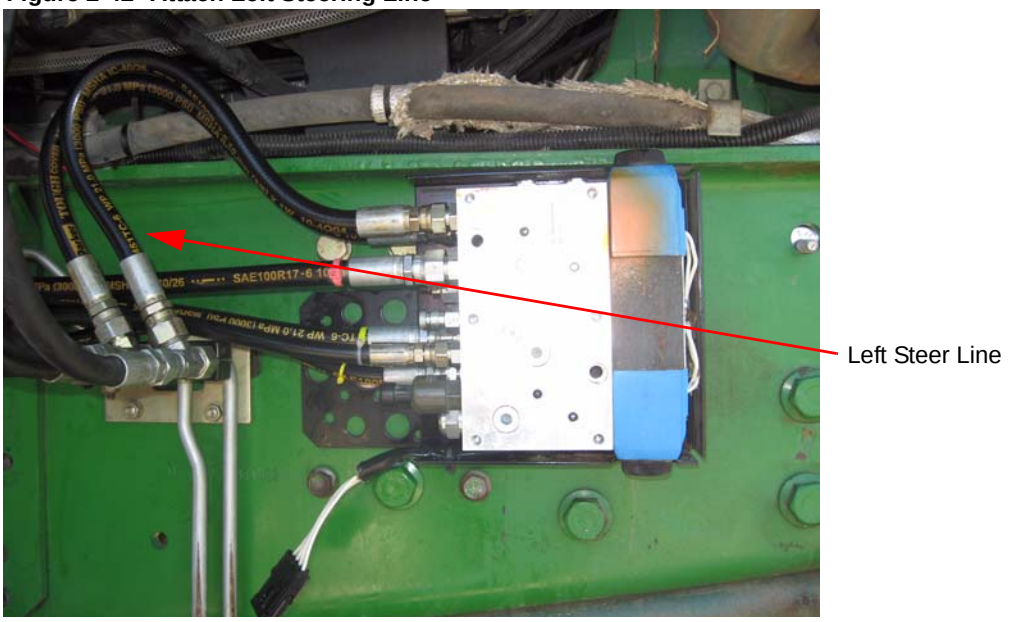
Figure 2-41 Attach Right Steering Line



9. Attach the other 3/8" hose from the steer right line tee to the LEFT port on the steering valve as shown in *Figure 2-42*. Tighten the hose and adapter connections with a 13/16" wrench.

10. Tighten the adapters and original hose connections with a 15/16" wrench.

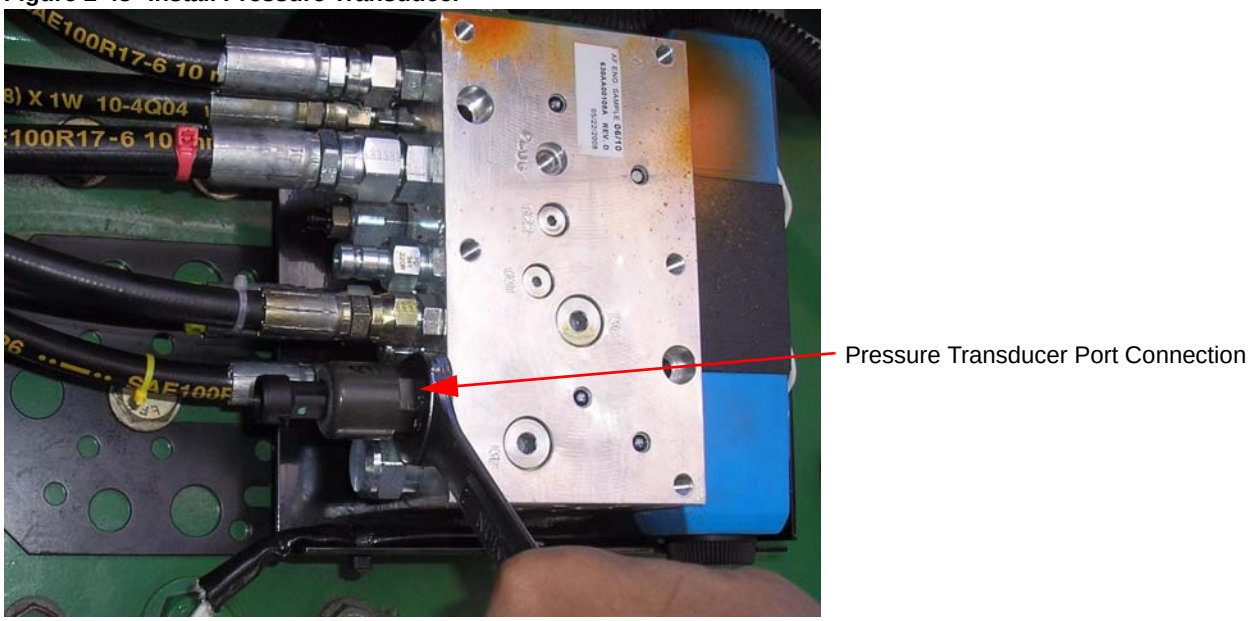
Figure 2-42 Attach Left Steering Line



Connect Pressure Transducer

1. Remove the plug from the TRANS port and attach the pressure transducer. Tighten the pressure transducer with a 3/4" wrench as shown in *Figure 2-43*.

Figure 2-43 Install Pressure Transducer

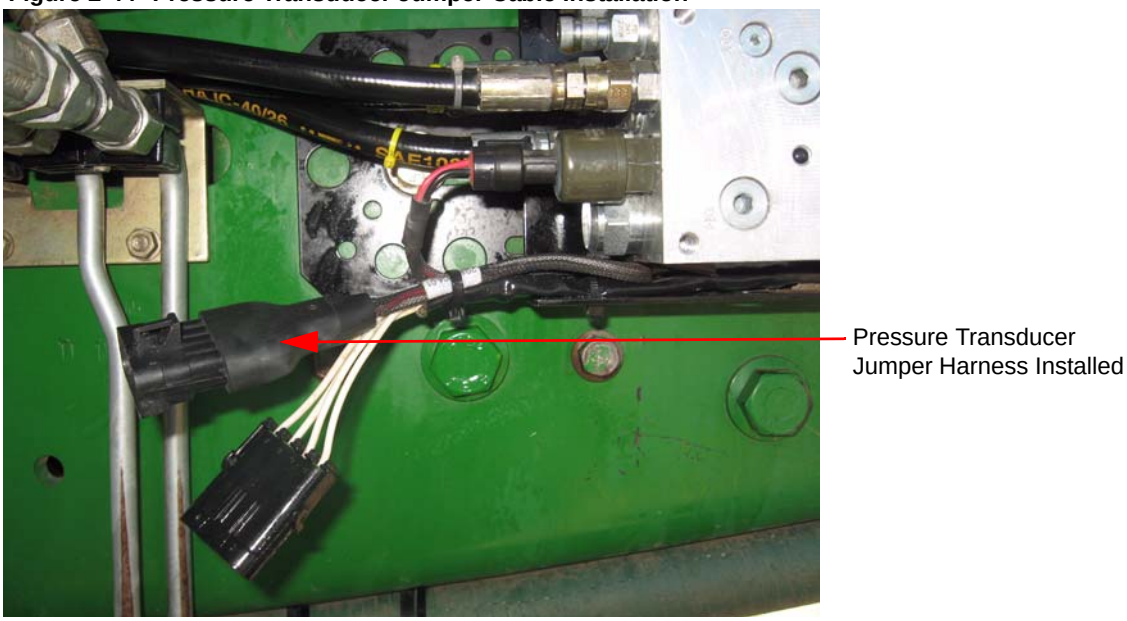


Note: Do not over tighten the pressure transducer.

2. Attach the transducer jumper harness to the pressure transducer

3. Coil the excess harness in between the valve and the outer cover. Cable tie the 4-pin and 10-pin connector together. See *Figure 2-44*.

Figure 2-44 Pressure Transducer Jumper Cable Installation



Pressure Relief Valve Adjustment

The steering valve has a built-in load sense relief valve that limits the maximum pump pressure when AutoSteering. The relief valve must be adjusted after the entire AutoSteer system has been installed and the system has been checked for hydraulic leaks. The display, roof module, and all harnesses must be connected prior to performing this procedure.

This procedure is provided in the Final Hardware Installation Checklist chapter after the rest of the installation has been completed. Do not forget to set this valve or system damage could occur.

Installation Checklist Before Proceeding to Startup

Before starting the vehicle after installing the valve and hoses, verify the following to prevent damage to the vehicle or oil spills.

1. The valve bracket bolt is tight.

2. The mounting bolts that secure the valve to the bracket are tight.

3. The PRESSURE hose is connected to correct port on AutoSteer Valve and power beyond pressure port.

4. The TANK hose is connected to correct port on AutoSteer valve and power beyond tank/return port.

5. The LS-OUT hose is connected to correct port on AutoSteer valve and the power beyond load sense port.

6. The LS ORBITROL hose is connected to correct port on the AutoSteer valve and the orbitrol load sense port.

7. The RIGHT steer hose is connected to the correct port on the AutoSteer valve and teed into the steer right line.

8. The LEFT steer hose is connected to the correct port on the AutoSteer valve and teed into the steer left line.

9. The Pressure Transducer has been installed and tightened.

10. All other hose fittings are tight.

11. Checked that all hose and cables have been routed so they will not be damaged by moving parts or foreign objects.

Wheel Angle Sensor (WAS) Installation

This **Wheel Angle Sensor Installation** chapter information is provided in the following sections:

- *Identify the Front Axle Type on the Vehicle*
- *Installing Mounting Brackets on the Left Side*
- *Mounting Brackets on the Right Side*
- *Cut the Wheel Angle Sensor Rods to Length*
- *Assemble the Linkage Rod Hardware*
- *Attach the Wheel Angle Sensor Rods to Brackets and Adjust*

Note: The Wheel Angle Sensor is optional equipment and is not provided with the installation kit. The Wheel Angle Sensor installation instructions are provided for special installations, when required.

Identify the Front Axle Type on the Vehicle

There is the possibility of multiple versions of front axles on these models of vehicles; however the wheel angle sensor kit will work with all of them. Some 7220 and 7320 vehicles and all 7130, 7230 vehicles will need to have the wheel angle sensor installed on the front left axle as shown in *Figure 3-1*. All the rest of the vehicle models will have the wheel angle sensor installed on the front right axle as shown in Figure *Figure 3-2*. First identify which axle the wheel angle sensor will need to be installed on. The installation procedure is slightly different for mounting the two sides. Follow the instructions given for the axle type for the installation being worked on.

Figure 3-1 Left Side Wheel Angle Sensor Installation

Figure 3-2 Right Side Wheel Angle Sensor Installation

Installing Mounting Brackets on the Left Side

1. Identify the wheel angle sensor mounting location on the front left steering axle as shown in *Figure 3-3*.

Figure 3-3 Wheel Angle Sensor Left Mounting Position

2. Remove the bolt on the steering axle case with an 18mm socket and ratchet as shown in *Figure 3-4*.

Note: A breaker bar may be necessary to loosen this bolt.

Figure 3-4 Remove Bolt

3. Attach the wheel angle sensor bracket as shown in *Figure 3-5*. Retighten the bolt so that the bracket is perpendicular to the ground.

Figure 3-5 Wheel Angle Sensor Bracket Mounted

4. Attach wheel angle sensor to the bracket as shown in *Figure 3-6*. The wheel angle sensor mounts on the back of the bracket on the left side. Tighten the bolts with a 9/16" socket and ratchet.

Figure 3-6 Wheel Angle Sensor Mounted

5. Attach the linkage bracket to the tie rod on the front axle as shown in *Figure 3-7*. Tighten the linkage clamps with a 1/2" socket and ratchet.

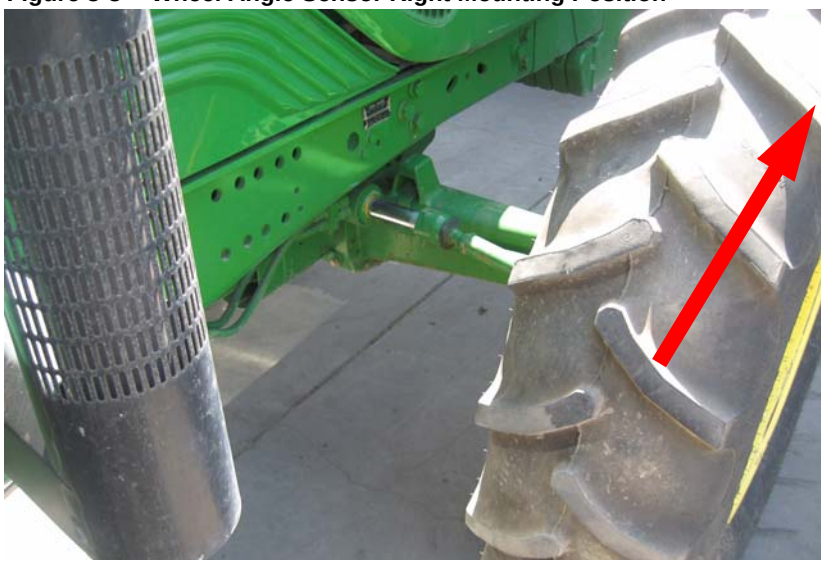
Note: The bracket should be spaced so it is approximately 4-3/4" (121 mm) from the rubber molding as shown. The bracket also mounts to the back of the tie rod.

Figure 3-7 Mount Linkage Bracket

Mounting Brackets on the Right Side

1. Identify the wheel angle sensor mounting location on the front right steering axle as shown in *Figure 3-8*.

Figure 3-8 Wheel Angle Sensor Right Mounting Position



2. Remove the bolt on the steering axle case with an 18mm socket and ratchet as shown in *Figure 3-9*.

Note: A breaker bar may be necessary to loosen this bolt.

Figure 3-9 Remove Bolt

3. Attach the wheel angle sensor bracket as shown in *Figure 3-10*. Retighten the bolt so that the bracket is perpendicular to the ground.

Figure 3-10 Wheel Angle Sensor Bracket Mounted

4. Attach wheel angle sensor to the bracket as shown in *Figure 3-11*. The wheel angle sensor mounts on the front of the bracket on the right side. Tighten the bolts with a 9/16" socket and ratchet.

Figure 3-11 Wheel Angle Sensor Mounted

5. Attach the linkage bracket to the tie rod on the front axle as shown in *Figure 3-12*. Tighten the linkage clamps with a 1/2" socket and ratchet.

Note: The bracket should be spaced so it is approximately 2-3/4" (70.0 mm) from the rubber molding as shown. The bracket also mounts to the front of the tie rod.

Figure 3-12 Mount Linkage Bracket

Cut the Wheel Angle Sensor Rods to Length

The wheel angle sensor rods are shipped longer than they need to be. These rods must be cut to the proper length to allow the linkage rods to provide the wheel angle sensor the maximum number of counts as the steering wheel is turned from full right to full left. Due to the variability of the possible mounting positions and axle options, it is left to the installer to verify the correct length for each individual installation and to cut the rods to length.

Table 3-1 provides the typical rod lengths that work for most installations. Before cutting the linkage rods to these measurements, verify that the wheel angle sensor brackets can attach to the vehicle as shown in this manual and that they are attached the correct distance from any reference points shown. If the axle does not allow the wheel angle sensor brackets to be installed as shown, do not cut the rods until it is determined what the proper lengths are for your installation. Due to possible variations in the mounting positions, these measurements could be different. These measurements are provided as a reference only. The installer is responsible for verifying that the provided measurements will work prior to cutting the rods.

Use a metal hack saw and vice as show in *Figure 3-14*, to cut the wheel angle sensor linkage rods to the proper lengths.

Note: It is advisable to attach a nut on the side of the metal rod that is going to be kept in order to clean the threads after the cut has been made.

The lengths of the rods are different depending on which side of the axle it is installed on. The table shows the lengths for both sides. Protect the threads from damage while cutting the rods. *Figure 3-13*. shows where the measurements provided in *Table 3-1* are measured from.

Table 3-1 Linkage Rod Cut Lengths

Item	Left Mounting	Right Mounting
Rod A	4-3/4 inches (121 mm)	4-7/8 inches (124 mm)
Rod B	11-1/2 inches (292 mm)	8-1/2 inches (216 mm)

Figure 3-13 Linkage Rod Cut Length Measurement Points

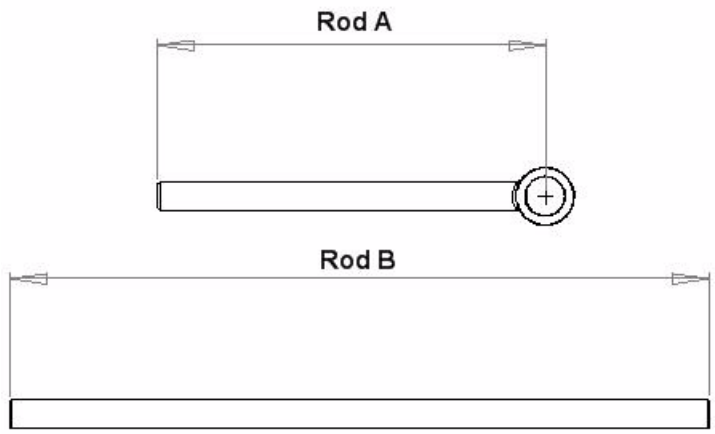
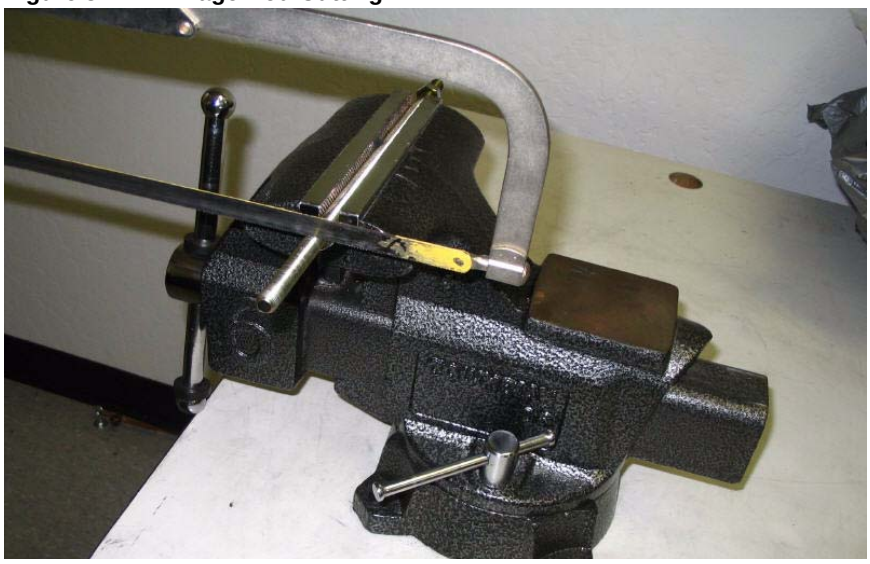


Figure 3-14 Linkage Rod Cutting



Assemble the Linkage Rod Hardware

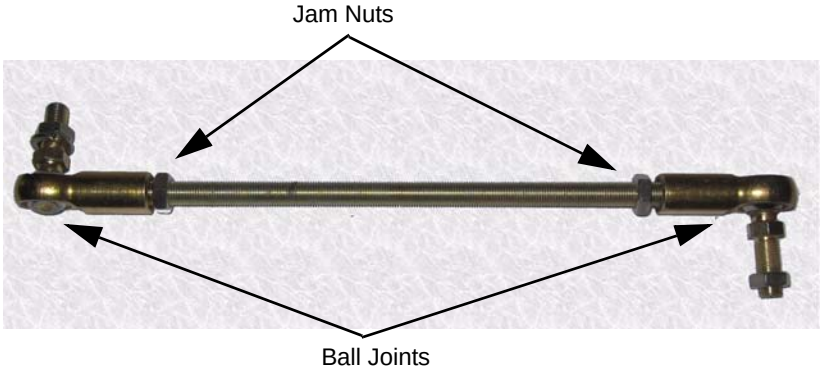
1. Attach a jam nut to the end of Rod A.
2. Connect the eye connector to the end of the wheel angle sensor rod. As shown in *Figure 3-15*.

Figure 3-15 Rod A Assembled

3. Attach the jam nuts to each end of the linkage Rod B
4. Attach the ball joints to both ends of the linkage arm as shown in *Figure 3-16*.

Note: The bolts for the ball joints should be facing the opposite direction as shown in *Figure 3-16* for this installation.

Figure 3-16 Linkage Rod Assembled

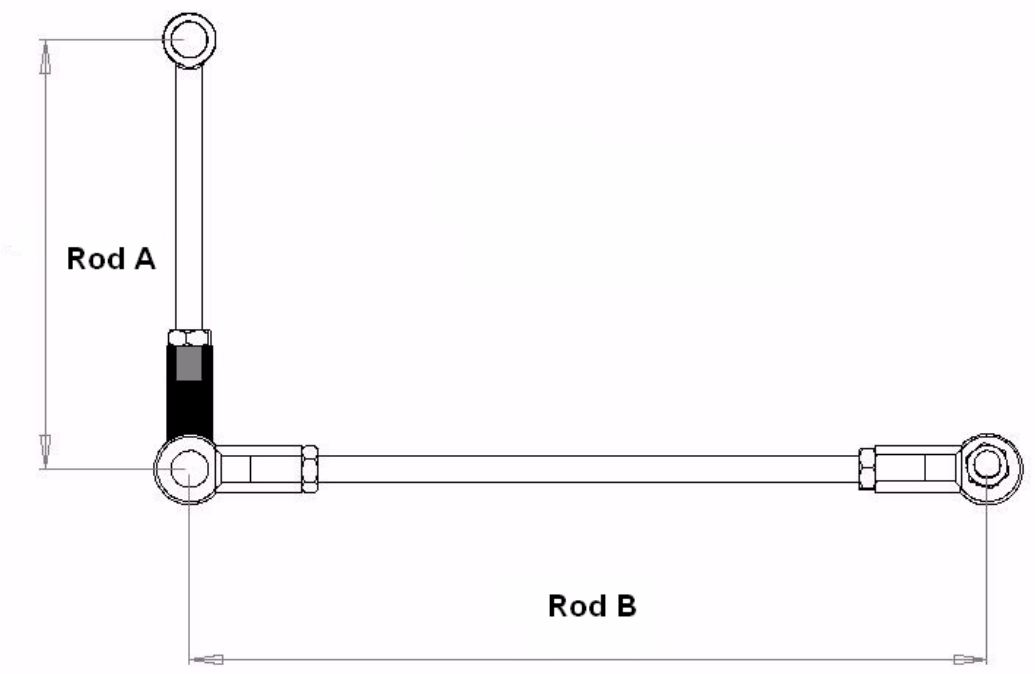


5. For most installations, use *Table 3-2* to adjust the lengths of the rod assemblies to the values shown. *Figure 3-17* shows where the measurement points for each rod are taken. Due to the variation of axle types and installation points, these measurements are provided as a reference only. Before connecting the steering rods and turning the steering axle verify that these lengths will work and the sensor will not be damaged.

Table 3-2 Assembled Linkage Rod Length

Item	Left Mounting	Right Mounting
Rod A	5-3/4 inches (146 mm)	5-7/8 inches (150 mm)
Rod B	13-3/8 inches (340 mm)	10-3/16 inches (260 mm)

Figure 3-17 Assembled Linkage Rod Measurement Points

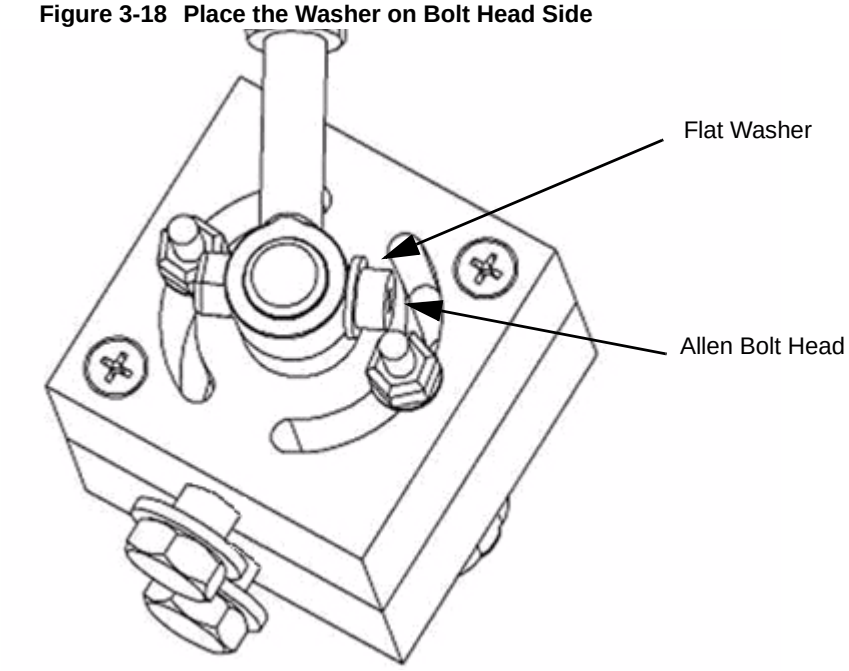


Attach the Wheel Angle Sensor Rods to Brackets and Adjust

1. Attach the wheel angle sensor rod to the wheel angle sensor.

Note: The flat washer goes on the bolt head side and NOT the nut side when attaching the arm. See *Figure 3-18*.

Figure 3-18 Place the Washer on Bolt Head Side



2. Tighten the wheel angle sensor arm with a 3/8" wrench and 1/8" Allen wrench.
3. Attach the linkage rod to the linkage bracket. The bolt attaches from below the "L" bracket and the nut and lock washer go on top. Tighten the ball joint to the bracket with a 1/2" and 9/16" wrench. *Figure 3-19* shows the right side rods connected. *Figure 3-20* shows the left side rods connected.

Figure 3-19 Right Linkage Connections

Figure 3-20 Left Linkage Connections

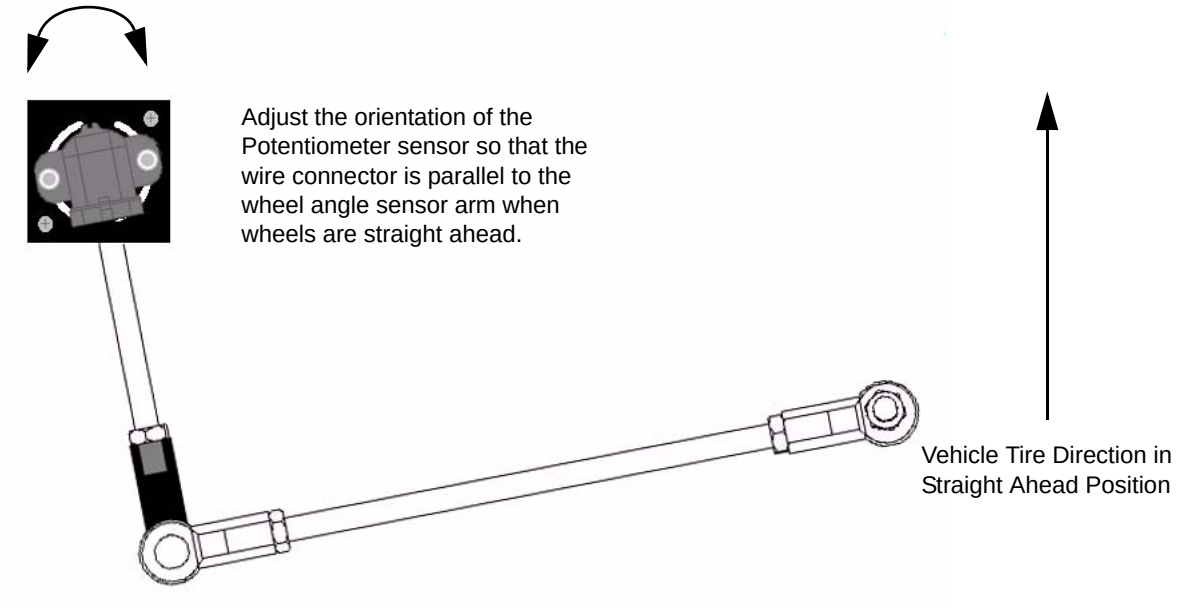
Note: Never attach the linkage rods to wheel angle sensor rod and turn the steering wheels manual or automatically until the fit has been verified. The linkage rods must remain apart while the steering wheels are turned to the maximum right and left positions and then temporarily attached at these positions. Failure to do this may cause the wheel angle sensor or vehicle to become damaged.

Note: After the linkage rods are assembled in the following steps, they should move freely without touching any other parts and without overextending. Make any necessary adjustments to the linkage rods if there is an interference problem.

Note: Always shut down the vehicle when working around the steering axle and checking and adjusting the wheel angle sensor rod lengths. The steering axle could move suddenly and cause severe injury or death.

4. With the linkage rods disconnected, manually turn the steering wheel so that the wheels are centered (the vehicle will travel straight ahead when moving).
5. Temporarily attach the linkage rods.
6. Rotate the wheel angle sensor potentiometer on top of the mounting block so that the plastic wire connector is parallel to the wheel angle sensor rod. See *Figure 3-21*.

Figure 3-21 Adjust Potentiometer Angle to Match Straight Ahead


Adjust the orientation of the Potentiometer sensor so that the wire connector is parallel to the wheel angle sensor arm when wheels are straight ahead.
Vehicle Tire Direction in Straight Ahead Position

7. After the potentiometer has been adjusted, tighten the potentiometer bolts with a 3/8" wrench and 5/32" Allen wrench.
8. Disconnect the linkage rods and turn the steering wheel manually to the full left position.
9. Reattach the linkage assembly and verify that the sensor or rods will not be damaged. Adjust the rod lengths as necessary. *Figure 3-22* shows the left axle installation. *Figure 3-23* shows the right axle installation.

Figure 3-22 Confirm Maximum Steer Left Position on Left Axle

Figure 3-23 Confirm Maximum Steer Left Position on Right Axle

10. Disconnect the linkage rods and turn the steering wheel manually to the full right position.

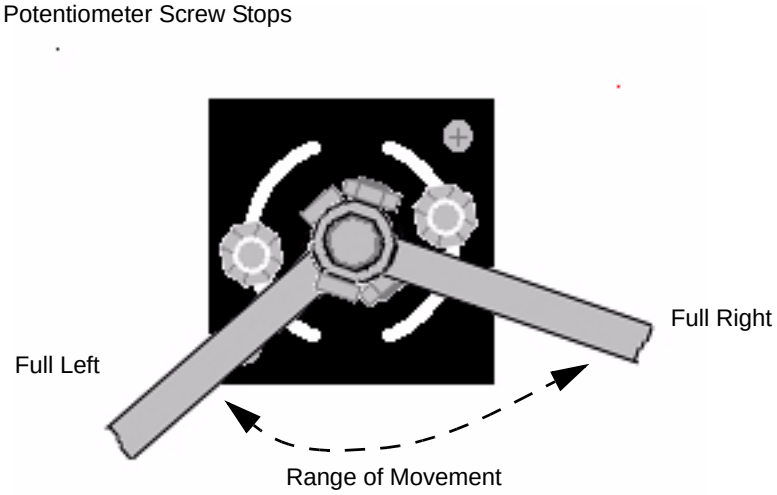
11. Reattach the linkage assembly and verify that the sensor will not be damaged. Adjust the rod lengths as necessary. *Figure 3-24* shows the left axle installation. *Figure 3-25* shows the right axle installation.

Figure 3-24 Confirm Maximum Steer Right Position on Left Axle

Figure 3-25 Confirm Maximum Steer Right Position on Right Axle

12. Repeat Steps 4 through 11 until the rod lengths have been adjusted and the potentiometer is centered to get the maximum sensor movement. The maximum movement is reached when the wheel angle sensor rod will sweep from approximately 3/16 inch (5mm) from both bolt heads holding the potentiometer on to the block when the wheels are turned to the maximum right and left positions. See *Figure 3-26*.

Figure 3-26 Maximum Sensor Movement



Note: An Ohm meter can also be used to determine if there is enough sensor movement. Connect the Ohm meter to pins A and B of the wheel angle sensor. Measure the Ohm reading at the maximum left and right position. After subtracting the smaller number from the larger number, there should be at least a 3.75 kilohms change. The reading should also never go below 1.6 or higher than 6.6 kilohms as this is reaching the limits of the potentiometer and could damage the sensor.

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13. Once all the adjustments are complete, tighten all lock nuts and bolts on the linkage and wheel angle sensor rod. A 1/2" and two 9/16" wrenches are required to tighten all the connections.

SA Module Installation

The **SA Module Installation** chapter contains information in the following sections:

- *SA Module Mounting Orientation*
- *Mount the SA Module*

SA Module Mounting Orientation

The SA Module can also only be mounted in certain orientations. *Figure 4-1* shows the correct mounting positions and *Figure 4-2* shows incorrect mounting positions.

Figure 4-1 Correct SA Module Mounting Orientations

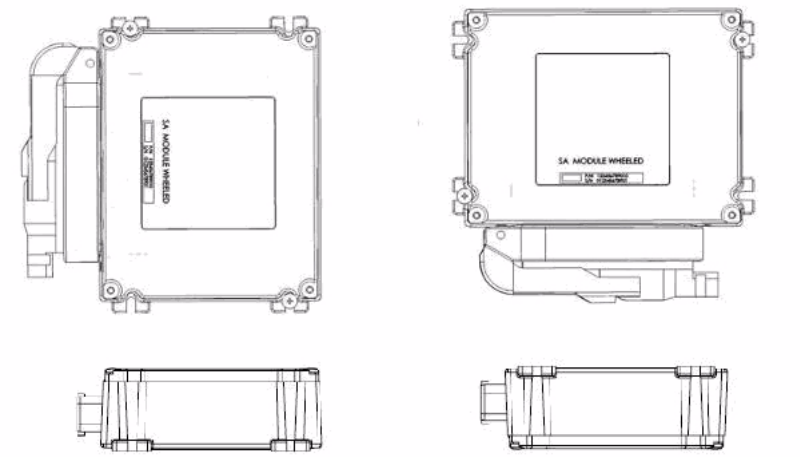
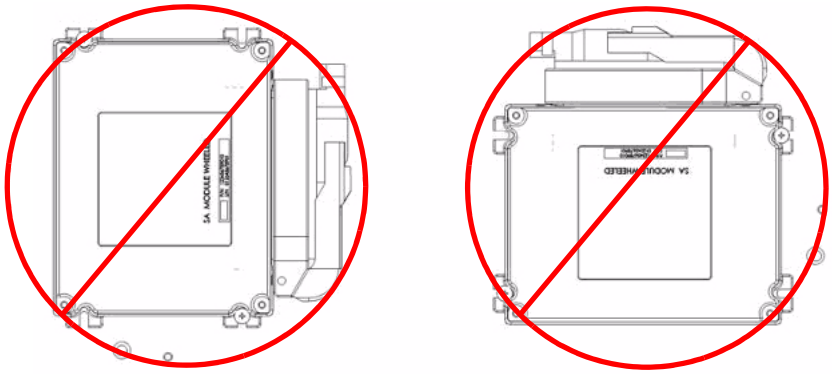


Figure 4-2 Incorrect SA Module Mounting Orientations

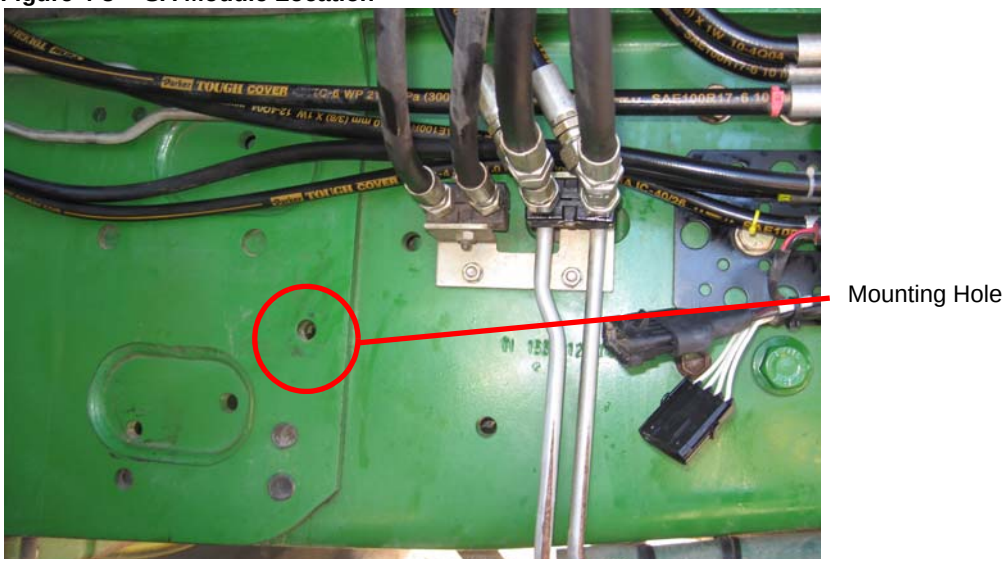


Mount the SA Module

Due to the variety of options available on vehicles and the possible configuration differences, it may be necessary to install the SA Module in location other than the example shown here. If an alternative location is required, choose a location where the SA Module can be protected from damage from moving parts or crop debris and excessive moisture from weather and cleaning equipment.

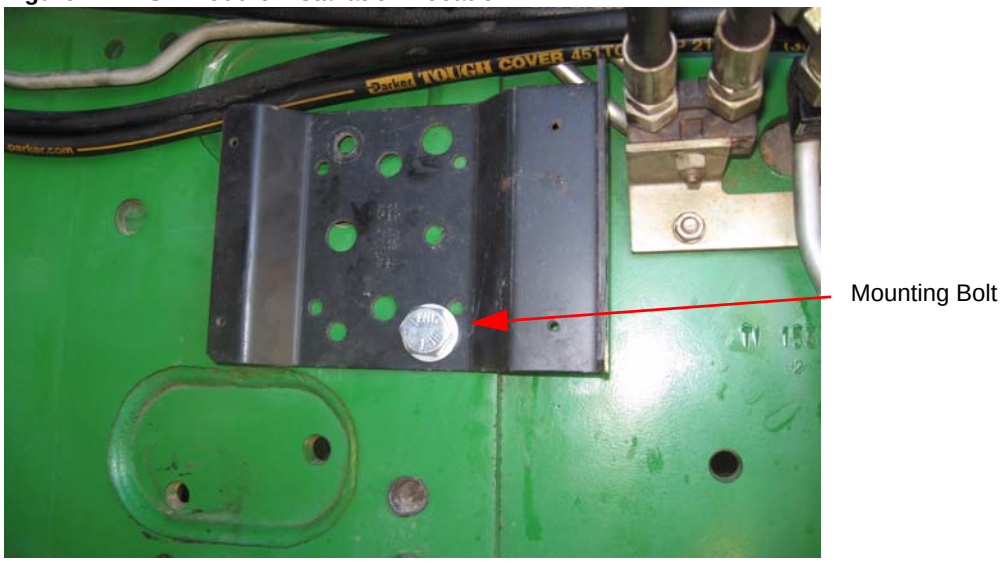
1. Locate an open hole on the side of the frame below the cab on the right side near where the steering valve has been installed. See *Figure 4-3*.

Figure 4-3 SA Module Location



2. Attach the SA Module bracket to the vehicle frame with a M12 x 50mm bolt flat washers, and nut from the valve installation kit. See *Figure 4-4*. Tighten the bracket with a 19mm wrench and socket and ratchet.

Figure 4-4 SA Module Installation Location



3. Attach the SA Module to the bracket with the connector facing down with the four screws provided in the installation kit. Tighten the screws with a #2 Philips screwdriver. See *Figure 4-5*.

Note: The connector must point down.

Figure 4-5 SA Module Attached to the Bracket

Roof Module Installation

This **Roof Module Installation** chapter contains information in the following sections:

- *Safety Notes*
- *Quick Release Rail Installation*

Safety Notes

- The AutoSteer system must be powered OFF when installing or removing the Roof Module.
- The Roof Module must always be firmly secured to the roof rail using the hardware whenever the vehicle is in operation to prevent the roof module from releasing from its bracket and falling.
- The Roof Module must be removed when transporting the vehicle at speeds above 30 mph.
- Ensure you are in a stable position on the tractor platform when removing the Roof Module, so that you do not fall or drop the Roof Module.
- Use a ladder to install the AutoSteer roof rail.

WARNING
Ensure that you are in a stable position on the tractor platform when installing or removing the roof rail and roof module, so that you do not fall.

Quick Release Rail Installation

1. Place the ladder as close as possible to the side of the cab.

Note: The ladder is necessary to install the roof rail and roof module.

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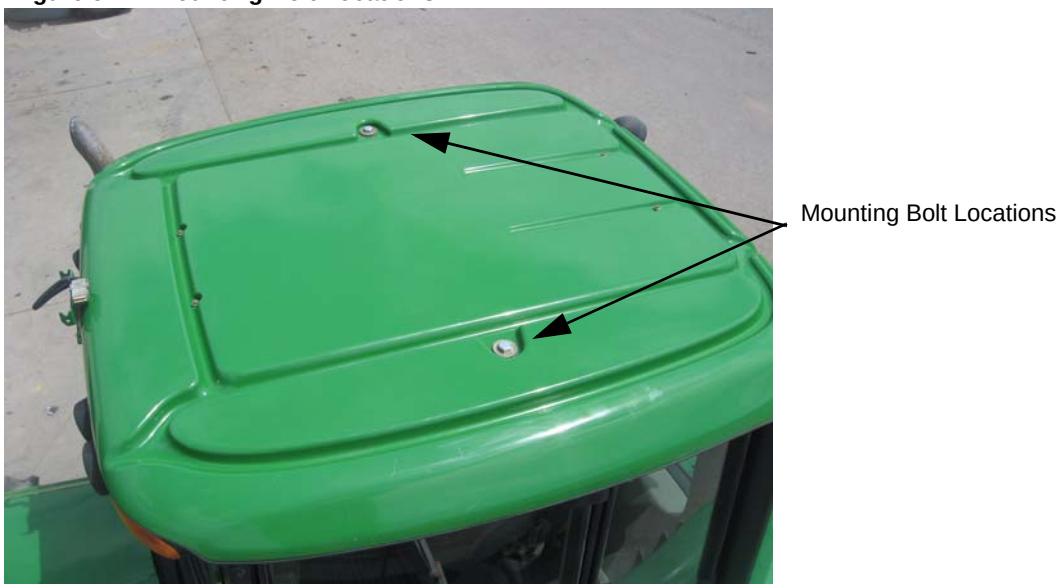
2. Locate the two bolts shown in *Figure 5-1* on each cab roof side.

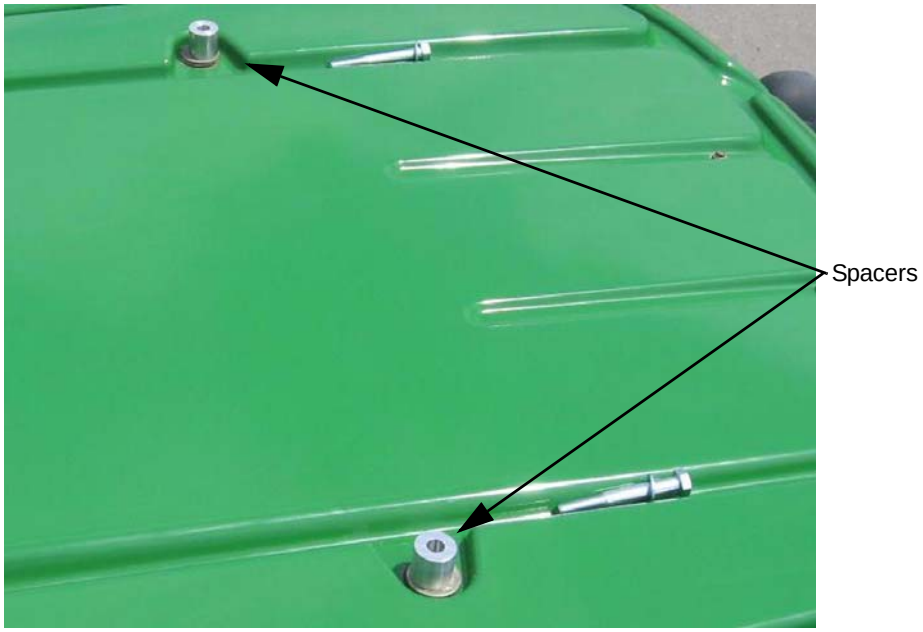
3. Remove the two bolts on each side. See *Figure 5-1*.

Figure 5-1 Mounting Bolt Locations



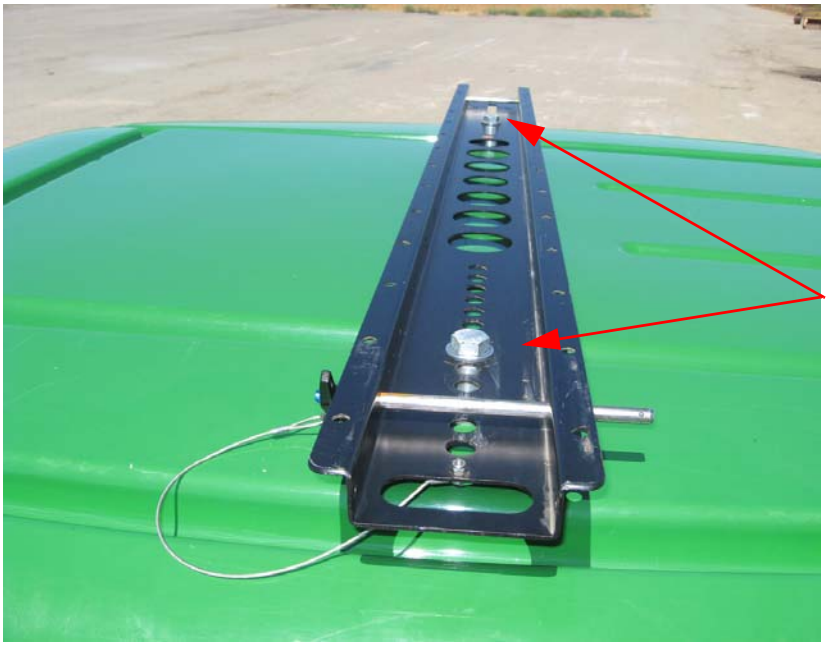
4. Place 4 of the flat washers provided with the installation kit on top of the existing washer on both bolt holes. See *Figure 5-2*.
5. Place the quick attach rail on top of the washers and center it over the cab. See *Figure 5-2*.
6. Place another flat washer on top of the quick attach rail and then install the longer mounting bolts provided with the installation kit.

Figure 5-2 Mount Rail on Spacer



7. Tighten the quick attach rail securely with a 15/16" socket, short extension, and ratchet. See *Figure 5-3*.

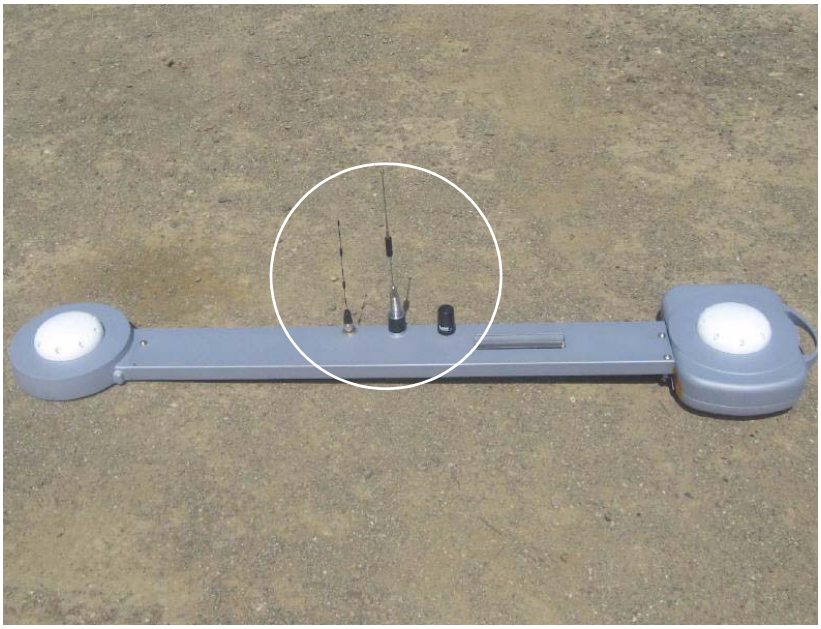
Figure 5-3 Tighten Rail Bolts



8. Attach the three antennas to the proper roof module antenna connections. See *Figure 5-4*.

Note: Hand tighten the connections. Do not over tighten.

Figure 5-4 Attach the Antennas



9. Place the roof module on the quick attach rail. See *Figure 5-5*.

Figure 5-5 Roof Module on Rail

10. 9.Remove the locking pin from the quick attach rail. See *Figure 5-6*.

Note: Press the button on the end of the handle to allow the pin to be removed.

Figure 5-6 Removing the Locking Pin

11. Adjust the roof module position on the rail.

12. Re-insert the locking pin to lock the roof module onto the vehicle. See *Figure 5-7*. The roof module installation is complete.

Figure 5-7 Locking Pin Inserted

Display Installation

This **Display Installation** chapter contains information for installing and adjusting the Display in the following sections:

- *Introduction*
- *Installation Procedure*

Introduction

This manual provides the instructions for installing the RAM mount ball in the cab so that the user display can be attached later. Refer to your display's User Manual for instructions on installing the display.

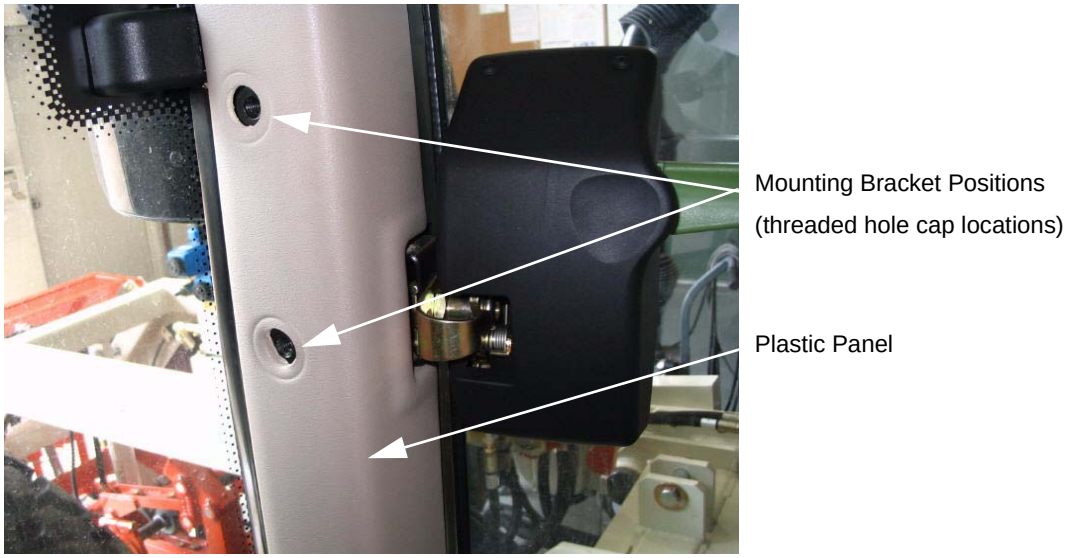
Note: The display components may be different depending on the model vehicle the installation is being performed upon.

Installation Procedure

Note: There are a number of mounting threads behind the plastic post cover which enable different display vertical mounting positions. If you need to change the vertical position of the display from the existing position, you need to remove the cab post plastic cover and cut holes through it using the marked positions on the inside of the plastic cover as a reference. You should hold the bracket up to the new set of holes you are going to use to verify vertical position and clearance of the display before cutting holes through the plastic cover.

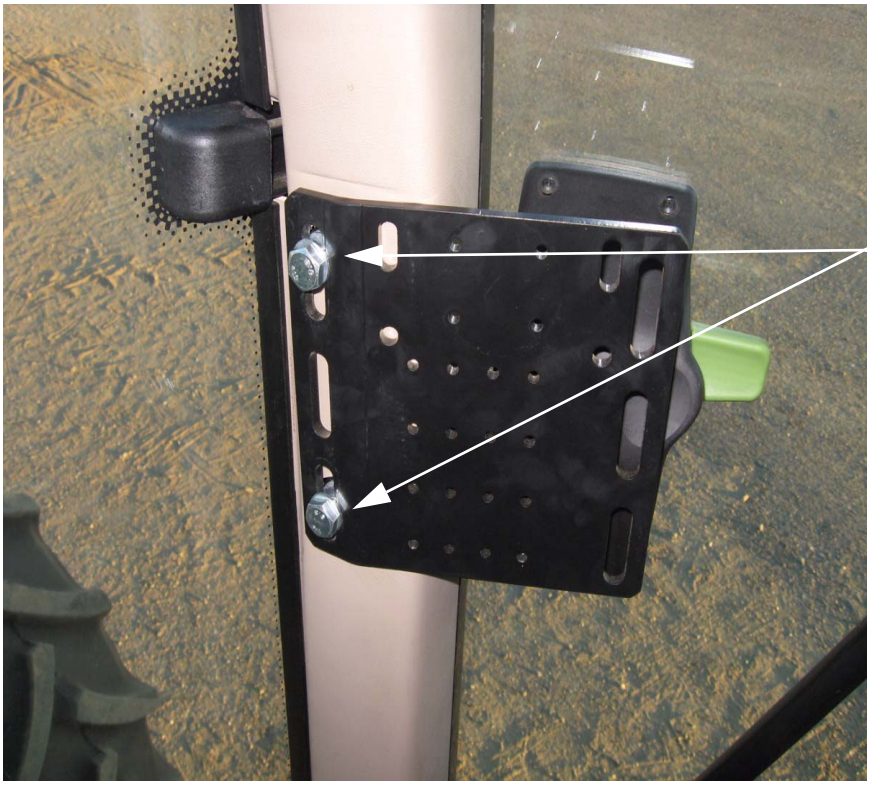
1. Unscrew the threaded plastic hole caps from the cab post. See *Figure 6-1*.

Figure 6-1 Remove Plastic Mounting Hole Covers



2. Choose the slots on your display bracket that provide a good mounting height.
3. Install the Display bracket on the right side of the cab using the two bolts provided. Three washers also need to be placed between the bracket and the cab post to allow space for the bracket to angle back towards the window. See *Figure 6-2*. Tighten the bolts with a 17mm socket and ratchet.

Figure 6-2 Mounted Display Bracket



4. Install the RAM Mount base ball (1-1/2” diameter) on the bracket, and secure the RAM base using four 10-32x3/4 Phillips screws and locknuts. Tighten the bolts with a #2 Philips screwdriver and a 3/8" wrench. See *Figure 6-3*.

Note: Refer to the display User Manual for the remaining display specific installation instructions.

Figure 6-3 RAM Ball Mounted

Connecting System Cables

This **Connecting System Cables** chapter provides information in the following sections for connecting the Main Cable Harness and the SA Module Cable Harness to various vehicle and AutoSteer components:

- *SA Module Harness*
  - *SA Module Connection*
  - *Wheel Angle Sensor Connection*
  - *Steering Valve Connections*
- *Main Cable Harness*
  - *Roof Module*
  - *Display*
  - *SA Module Harness*
  - *Cab Power*

SA Module Harness

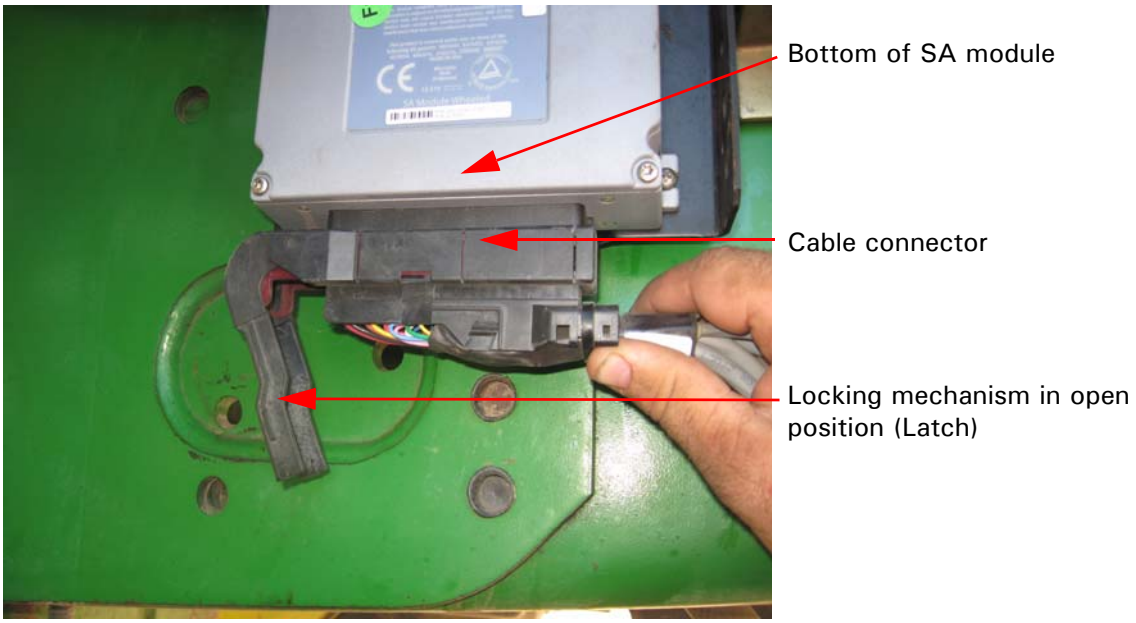
This **SA Module Harness** section contains the following sub-sections:

- *SA Module Connection*
- *Wheel Angle Sensor Connection*
- *Steering Valve Connections*

SA Module Connection

1. Connect the SA Module cable harness to the SA Module. See *Figure 7-1*.

Figure 7-1 Connecting SA Module Connector (different vehicle shown)



2. Close the cable connector locking mechanism as shown in *Figure 7-2*.

Figure 7-2 SA Module Connector (closed).

3. Route the cable toward the cab under the right side of rear window for connection to the Main Cable Harness.
4. Route the other half of the SAM harness under the cab towards the steering valve and the optional wheel angle sensor.
5. Proceed to the *Wheel Angle Sensor Connection* procedure.

Wheel Angle Sensor Connection

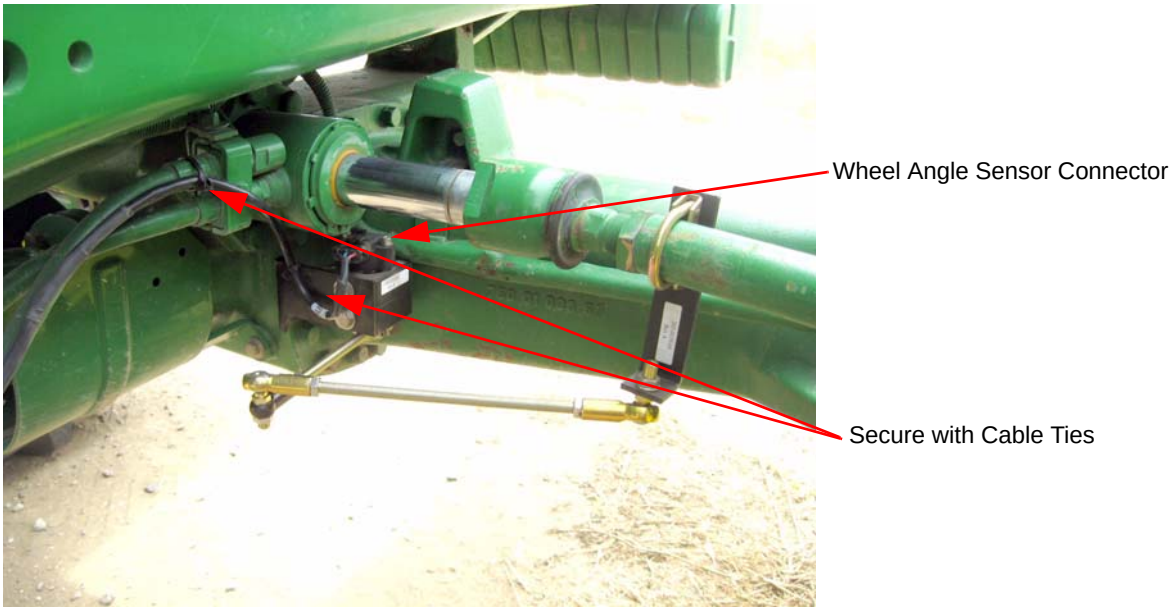
Note: This connection to the Wheel Angle Sensor is only required when using the AutoSteer Wheel Angle Sensor.

1. Route and secure the WAS cable from the SA Module beneath the cab to the Wheel Angle Sensor.

   Note: Use a cable puller to make routing the cable under the cab easier.

2. Attach the cable to the Wheel Angle Sensor and secure the cable to the Wheel Angle Sensor bracket near the Wheel Angle Sensor with a cable tie so the cable does not strain the connector. See *Figure 7-3*.

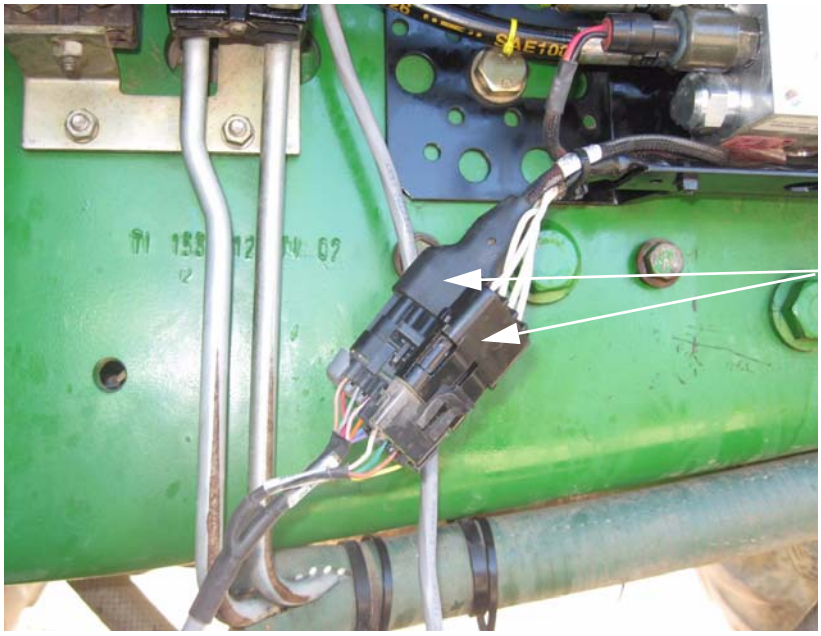
Figure 7-3 Wheel Angle Sensor Connection



Steering Valve Connections

1. Route and secure the steering cable from the SA Module to the hydraulic valve.
2. Connect the SA Module Harness 4-pin and 10-pin connectors to the steering valve. See *Figure 7-4*. 3. Coil any excess cable and secure with cable ties.

Figure 7-4 Steering Valve Connections



SA Module Data and Power Cable

1. Route the SA Module harness's data and power cable towards the back of the vehicle under the right side of the cab.
2. Leave the connectors in an accessible place to attach to the main data harness later.

Main Cable Harness

This Main Cable Harness section contains the following sub-sections:

- *Roof Module*
- *Display*
- *SA Module Harness*
- *Cab Power*

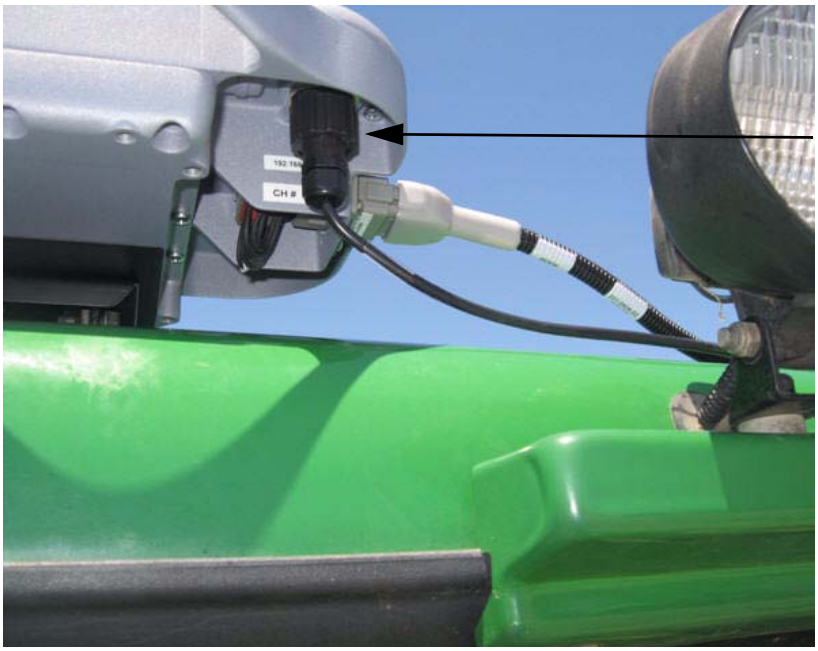
Roof Module

1. Route the Main Cable Harness cables out of the cab through the rubber plug under the rear window. See *Figure 7-5*.

Figure 7-5 Cab Rear Window Rubber Plug

Connect the Ethernet cable to the Roof Module. See *Figure 7-6*.

Figure 7-6 Roof Module Ethernet Connection



2. Connect the Main Harness to the Roof Module connector. See *Figure 7-7*.

Figure 7-7 Connecting the Main Harness to Roof Module

3. Route the main harness towards the back of the cab roof along the roof rail. See *Figure 7-8*.
4. Route the cable down the right side of the cab. See *Figure 7-8* and *Figure 7-9*.

Figure 7-8 Routing the Main Cable Harness (image 1)

Figure 7-9 Routing the Main Cable Harness (image 2)

Display

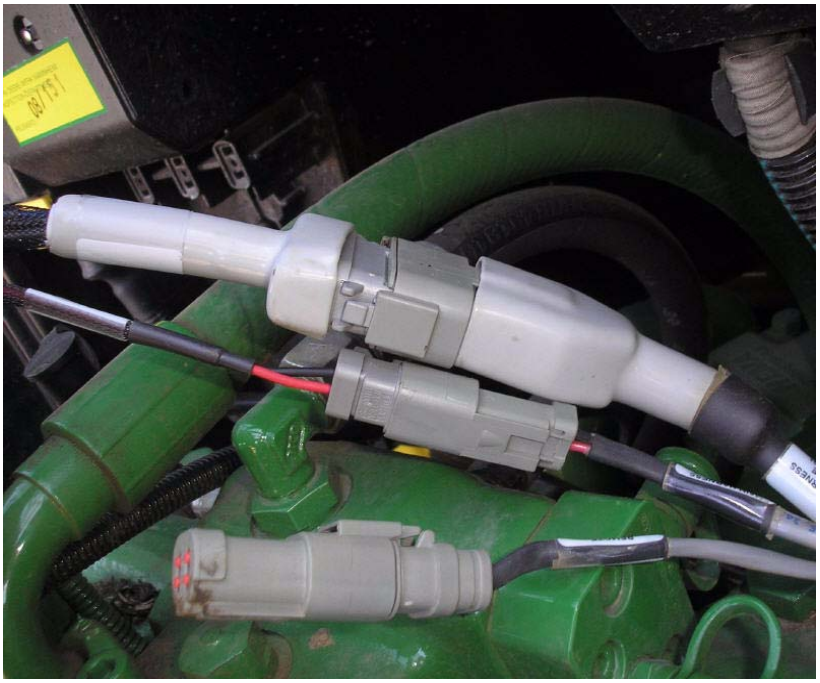
1. Attach the Main Cable Harness to your display harness.

Note: Refer to your Display Owners manual for details on connecting the display harness.

SA Module Harness

1. Connect the 12-pin data and 2-pin power connectors between the Main Cable Harness and the SA Module Harness. See *Figure 7-10*.

Figure 7-10 SAM Harness to Main Cable Harness Connections



Cab Power

Note: The steps listed below show the procedure for connecting to the power outlet inside the cab. If you are not using the power outlet inside the cab refer to your display User Manual for cab power connection instructions.

1. Locate the 12V power outlet on the cab console right side. See *Figure 7-11*.
2. Attach the display power adapter cable to the cab power outlet following the instructions in your display's user manual. See *Figure 7-11*.

Figure 7-11 Cab 12V Power Outlet

Final Hardware Installation Checklist

This **Final Checklist** chapter contains information in the following sections:

- *Hydraulic Leak Check*
- *Adjusting the AutoSteer Relief Valve*
- *Final Installation Checklist*

Hydraulic Leak Check

On completion of installing the entire GPS AutoSteer system including the roof module and user display, the system needs to be checked for leaks. Follow the procedure below to check for leaks.

1. Clear any bystanders away from the vehicle. If there is a hydraulic leak, they could be injured.
2. Put the vehicle into Park or set the park brake to prevent the vehicle from moving.
3. Turn the vehicle over for a few seconds and if the vehicle starts, immediately shut it down.
4. Walk around the vehicle and check all the hydraulic fittings that were opened. Look for any oil leaks.
5. Once all leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.

Note: If an oil leak is noticed during any part of this test, immediately shut down the vehicle and repair the leak.

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6. Turn the steering wheel manually to the right and left stops two or three times to get any air out of the hoses.
7. Confirm the wheels turn in the correct direction and that the wheels steer the same as they did before the system was installed.
8. Shut down the vehicle, walk around it again, and check for any hydraulic leaks.
9. Once the leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.
10. Power up the GPS steering display.
11. Power ON your display and navigate to the **Hydraulic Valve** screen from the **Steering Components** menu.
12. Command the vehicle to turn Right and then Left a few times. The front wheels should turn the direction they are commanded. If they go the wrong direction, the hoses were attached to the wrong ports on the valve and need to be switched.
13. Power down your display and shutdown the vehicle.
14. Once again check the vehicle for hydraulic leaks and repair any that are found.
15. Continue on to the Pressure Relief Valve Adjustment

Adjusting the AutoSteer Relief Valve

The steering valve has a built-in load sense relief valve that limits the maximum pump pressure when AutoSteering. The relief valve must be adjusted after the entire AutoSteer system has been installed and the system has been checked for hydraulic leaks. The display, roof module, and all harnesses must be connected prior to performing this procedure.

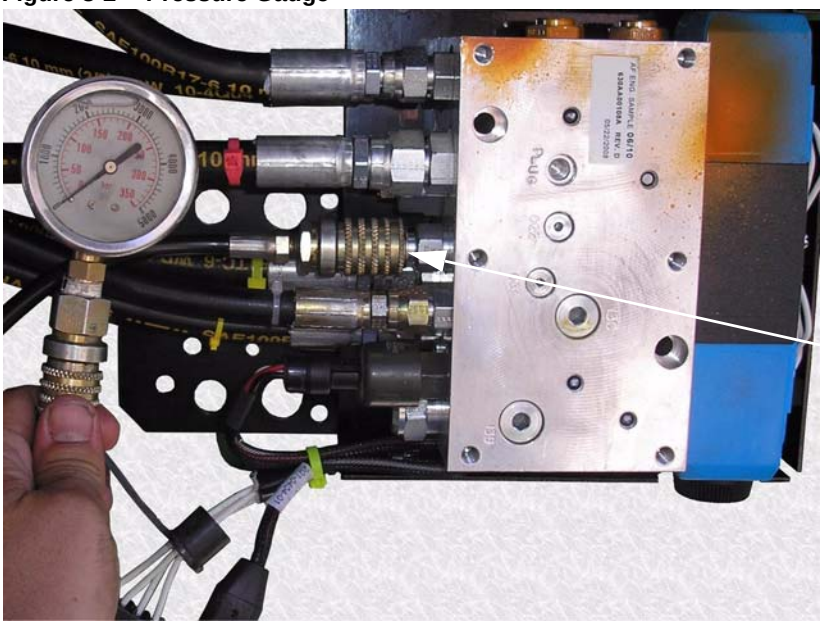
Note: The relief valve in *Figure 8-1* is shown on a bench without the hydraulic hoses connected for ease of viewing the adjustment process. When you adjust the relief valve, it is done with the valve mounted on the vehicle and the hydraulic hoses connected.

Figure 8-1 AutoSteer Relief Valve Adjustment

Relief Valve Adjustment Procedure

1. Attach a 5000 psi pressure gauge to the AutoSteer valve diagnostics port labeled as GP. Use a short extension hose on the pressure gauge if necessary for easier reading. See *Figure 8-2*.

Figure 8-2 Pressure Gauge



2. Put transmission into “neutral” or “park” position and turn on the hand brake.
3. Start the engine and leave it at low idle.
4. Immediately check for oil leaks on all hose connections that were opened.
5. Turn the steering wheel full right and then full left and check for correct manuals steering response. Immediately check for oil leaks on all hose connections that were opened. Air in the hoses may cause a slight steering delay when the system is first powered up.
6. Observe the standby pump pressure shown on your pressure gauge. Standby pressure should be very low, or around 350psi. If standby pump pressure is zero or less than 100psi, you might have inverted the Pressure and Tank hoses.
7. Clear any bystanders from around the vehicle because you will be moving the front wheels in the next step.
8. With the display turned ON access the **Hydraulic Valve** window from the **Steering Components** Window and command the steering full Right and full Left. The front wheels will turn towards each of the directional stops. The maximum pump pressure will be indicated on the pressure gauge when the wheels hit the stops.
9. Adjust the AutoSteer relief valve so that the maximum pump pressure is 2100 psi when the wheels hit the stops.
10. Tighten the jam nut on the relief valve once the correct pressure setting has been adjusted.
11. Remove your pressure gauge by sliding the sleeve on the quick coupler.

Note: Turn off the engine before adjusting the relief valve. Turning the engine off will prevent possible vehicle movement or a high pressure fluid hazard. Do not adjust the relief valve with the engine running.

Final Installation Checklist

Note: The Final Hardware Installation Checklist is on the back of this page. Fill in the checklist after the installation. You should keep a copy of this checklist for future reference when servicing the AutoSteer system.

Machine Model: _____ Year: _____ Serial #: _____

Customer Name: _____

Location/Address: _____

AutoSteer Installation Kit Part Number: _____

NOTES

_____

_____

_____

_____

_____

_____

Name of Installer: _____ Date: _____

System Installation Checklist

1. Wheel Angle Sensor Installed and all fasteners are tight. (optional) ☐
2. Monitor Bracket Installed and all fasteners are tight. ☐
3. Roof rail is installed and all fasteners are tight. ☐
4. SA Module is installed and all fasteners are tight. ☐
5. All cable ends are connected. ☐
6. All cables are secured with cable ties. ☐

Hydraulic Installation Checklist

1. Valve bracket is installed and all fasteners are tight. ☐
2. Valve is installed and all fasteners are tight. ☐
3. All hose fittings are tight. ☐
4. Check for oil leaks on all hydraulic connections. ☐
5. All hoses are routed and secured with cable ties. ☐
6. Manual steering is normal after the AutoSteer installation. ☐
7. Ensure the relief valve has been adjusted. ☐

AutoSteer Performance Checklist

1. Complete the AutoSteer system calibration. ☐
2. Complete the AutoSteer system tuning. ☐
3. Check total wheel angle sensor counts. (optional) ☐ Value_____
4. Line acquisition is good. ☐
5. On-line steering is good. ☐
6. Manual override (kick-out) is working. ☐
7. Steering speed from lock-to-lock is good. ☐ Value_____Sec.

Note: See the *Calibration and Tuning Notes* chapter for additional information.

Calibration and Tuning Notes

This **Calibration and Tuning Notes** chapter contains information for starting the Calibration and Tuning procedures in the following sections.

- *Vehicle Specific Installation Calibration and Tuning Guidelines*
  - *Transducer Calibration*

Note: Refer to your system user manual for system setup calibration and tuning details.

Vehicle Specific Installation Calibration and Tuning Guidelines

Note: For optimal steering performance, the AutoSteer system must be fully calibrated and then tuned.

Transducer Calibration

The transducer calibration procedure on this vehicle is different than other AutoSteer installations because the transducer is measuring a low pressure Load Sense pressure signal. In order to provide good manual kick-out response, you must calibrate the pressure transducer HIGH number to be about 3000 counts above the LOW number.

Confirm that the pressure transducer calibration is correct by testing the manual kick-out feature while driving in AutoSteer mode. AutoSteer should disengage when you turn the steering wheel. If spontaneous kick-out occurs while in AutoSteer mode, recalibrate the pressure transducer and increase the HIGH value slightly. Repeat this procedure until you obtain good manual kick-out without spontaneous kick-out in AutoSteer mode.

On this vehicle, the steering wheel will turn freely and AutoSteer should kick-out when the driver turns the steering wheel while in AutoSteer mode. This result is the expected behavior on this vehicle and is different than other AutoSteer installations where the steering wheel cannot be turned while in AutoSteer mode.